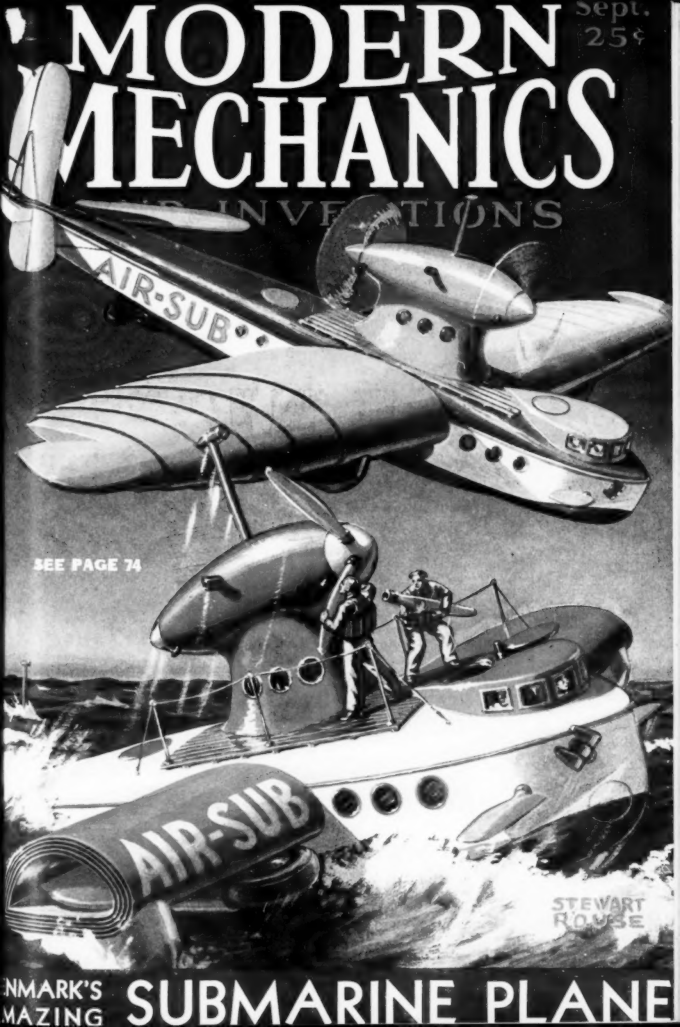

MODERN
MECHANICS
Sept.
25¢
INVENTIONS
AIR-SUB
SEE PAGE 74
AIR-SUB
STEWART
ROWSE
NMARK'S
MAZING
SUBMARINE PLANE

Only $2.00 down

BRAND NEW

GENUINE CORONA Model #3

Lowest Price—Easiest Terms

HERE'S your chance to own that *brand new* Genuine Model 3 Corona you've wanted—on the easiest terms ever offered—at LOWEST PRICE ever offered. Complete in every detail; back spacer, etc. *Manufacturer's Guarantee.* Recognized the world over as the **finest, strongest, sturdiest portable built.**

S. Joveton writes: "It truly is a wonderful machine. I am very pleased with it and find it very simple to work although it is the first typewriter I have ever used."

Don P. Finn, composer and pianist says: "Corona has helped me put my songs over and is still doing it. I find it just the thing for writing words to songs and for all correspondence to the profession."

F. J. Barsuglia, Jr., writes: "I am very well pleased with your little Corona and I must say I do not know what I would really do without it. It works like a charm and has every convenience of a larger machine."

Mrs. G. Bernstein says: "Allow me to thank you for prompt delivery of the Corona. I am delighted with it and know I shall derive great pleasure from its possession."

Yours for 10 DAYS FREE

Try this wonderful portable typewriter—the same machine that has satisfied 500,000 users. Experience the joy this personal writing portable typewriter can give you! Use it ten days free! See how easy it is to run and the splendidly typed letters it turns out. Ideal for the office desk, home, traveling. Small, compact, light, convenient. Don't send out letters, manuscripts, reports, bills in poor handwriting when you can have this Corona at such a low price on such easy terms. Remember these are *brand new* machines right out of the Corona factory.

Carrying Case Included

If You Act Now!

Leatheroid carrying case, oiler, instructions free on this offer. Send no money—just the coupon. Without delay or red tape we will send you the Corona. Try it 10 days. If you decide to keep it, send us only $2—then $3 a month until our special price of $39.90 is paid. Now is the time to buy. Mail coupon today!

Save Money—Use this Coupon

Smith Typewriter Sales Corp., (Corona Division)
469 E. Ohio St., Chicago, Ill. Dept. 179

Ship me the Corona, F. O. B. Chicago. On arrival I'll deposit $2 with express agent. If I keep the machine, I'll send you $3 a month until the $37.90 balance of $39.90 price is paid; the title to remain with you until then. I am to have 10 days to try the typewriter. If I decide not to keep it, I will repack and return to express agent and get my money back. You are to give your standard guarantee.

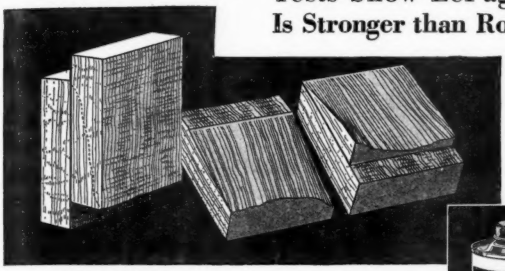
Name .....

Address .....

Employed by .....

Would You Believe It!

Tests Show LePage's Glue Is Stronger than Rock Maple



Right: Shows Rock Maple ripped apart under strain of 3000 lbs. per square inch but joint made with LePage's still perfect!

Left: Shows two blocks of Rock Maple lepaged together.

NOT just one test, but many tests. Over and over we've tried to break LePage's joints in rock maple on the Olsen Shear Testing Machine. You know what tough stuff rock maple is. But it's the rock maple that *always* gives. What a test for LePage's strength that is!

Look at the illustration above, taken from actual photographs. It wasn't the LePage's joint that gave way. It was the fibers of the rock maple that were ripped apart under a pressure of 3000 pounds per square inch.

LePage's Glue (Liquid, Hard or Waterproof) stands pressure of 3000 lbs. per sq. in. Stronger than the fibers of the wood it joins. Every batch is tested.

Any cabinet maker will tell you your finished work is as good as the strength and permanency of its joints. Use LePage's and be assured of immense and lasting strength.

LE PAGE'S GLUE

WHATEVER KIND OF GLUE YOU NEED LePAGE'S MAKES IT!

LE PAGE'S NEW WATERPROOF GLUE

For making joints that must stand the weather, use LePage's Waterproof Glue. Now available in convenient packages for home use.

LE PAGE'S LIQUID GLUE

Always ready for immediate use. No bother of preparation. Easier to work with because it sets slowly enough to give you plenty of time to adjust joints.

LE PAGE'S TESTED HARD GLUE

If you prefer to use a hard glue ask for LePage's Tested Hard Glue. Tested for uniform quality. No experimenting with each new lot to see how much water to add, or how long to cook.

You See This Can Wherever You Go

Carpenter Shops
Cabinet Makers
Golf Pro's Bench
Manual Training Schools
Upholstery Shops
In House Under Construction
Everywhere!

You Can Make This Spanish Galleon Yourself

LePage's Job Plan No. 26 shows how. Price complete only 10 cents. Order direct. Send 10 cents in coin or stamps. Specify Job Plan No. 26. Address: LePage's Craft League, 761 Essex Ave., Gloucester, Mass.

Vol. IV -- No. 5

A FAWCETT MAGAZINE

Other Fawcett magazines are Screen Play Secrets, Triple-X, Battle Stories, Startling Detective Adventures and True Confessions.

MODERN MECHANICS AND INVENTIONS

September, 1930

PRICE 25 CENTS

This magazine is not connected with or associated with any other magazine of a scientific or mechanical nature.

TABLE of CONTENTS for SEPTEMBER

Special Features

Crashing Models for Movie Thrills - - 38
By Dick Cole

How I Broke the World's Altitude Record - 48
By Lieut. Apollo Soucek, U.S.N.

Science's Greatest Adventure - - - 50

Defying Death in a Parachute - - - 62
By W. F. Scott

Footprints Trap the Forest Firebug - - 68
By Edwin Hogg

Tricks of the Rum Runners - - - 78
By Pat Roche

Mechanical Aids Help Stage Illusionist - - 88
By Sam Brown

Torture Devices of the Old Convict Ships - 94
By C. Moran

How I Solved the Helicopter Problem - 170
By Maitland B. Bleecker

Interesting Shorter Articles

A Picture of John D's Wealth - - - 50

Not Even Rules Fit Carnera - - - 61

Denmark's Amazing Submarine Plane - 74

Floating Playgrounds Keep Ocean Travelers Fit - - - - - - 92

National Forest Cabin Sights - - - 105

Making Photos as Big as Billboards - 112

How to Preserve Your Injured Trees - 122
By Martin L. Davey

Great "How-to-Build" Articles

An Airplane Swing for the Back Yard - - 124
By Dick Cole

COMING IN OCTOBER

An amusing and fascinating story of the strange inventions of Ed Wynn, "The Perfect Fool." Also a yarn on "The Miracles of Bird Migration" by one of the world's greatest authorities. Plans for the Anzani Longster, a single place Anzani-motored sport plane, will appear for the first time. Hints on how to prepare for a hunting trip, how a short change artist works and a story on the science of Japanese Jiu Jitsu will liven the cargo. Don't miss this issue!

The Design of the Georgias Special - - 136
By Orville Hickman

A Bicycle Side-Car - - 154
By Gene Morley

Model Plane Drops 'Chute 157

(Turn to page 6 for a further listing of contents)

Edited by Experts

Listed here are the members of the Modern Mechanics Board of Editors, all qualified by national repute to serve as authorities. They will gladly answer questions from readers concerning their departments. Address them in care of this magazine, Robbinsdale, Minnesota.

Major H. H. Arnold
Former Assistant Chief, U. S. Air Service

Pilot Gene Shank
Famous Aviator, Holder of Light Plane Endurance Flight Record

Weston Farmer
Naval Architect and Light Plane Designer

Ivan Driggs
Noted Light Airplane Designer

A. Neely Hall
Author of "The Boy Craftsman," etc.

L. B. Robbins
Nationally Known Radio Expert

Ray F. Kuns
Principal, Cincinnati Automotive Trade School

Percival Marshall
Foremost Exponent of Model Making in Great Britain

Philip L. Rhodes
Naval Architect

Charles Hall
Former Editor of "Motor Boat"

Jay Earle Miller
Associate Editor and Chicago Correspondent

Donald G. Cooley
Bob Gordon
J. Russell Dye
Associate Editors

Published monthly by Fawcett Publications, Inc., at 501 7th Ave. So., Minneapolis, Minnesota. MODERN MECHANICS AND INVENTIONS entered as second class matter September 20th, 1928, at the Post Office, Minneapolis, Minnesota, under the act of March 3rd, 1879. W. H. Fawcett, Publisher; Roscoe Fawcett, Managing Editor; Jack Smalley, Assistant Managing Editor. Copyright 1930. Ray Hynn, Advertising Manager; Chicago office, 25 East Washington Drive (Phone State 2935); New York office, 52 Vanderbilt Avenue, Room 606 (Phone Vanderbilt 8490). All manuscripts should be addressed to our editorial office at Robbinsdale, Minn. Manuscripts will not be returned unless accompanied by return postage. Advertising forms close on the 20th of the third preceding month. Price 25 cents a copy; $2.50 a year in the United States and possessions. Other Postal Unions, $3.00 per year. Printed in U. S. A.

LOW PAY.. LONG HOURS.. ROUTINE.. NO FUTURE

Always worrying over money. Always skimping and economizing—going without the comforts and luxuries that every man DESERVES for his family and himself.

The Time Clock—a badge of hawk-like supervision and The Rut. A constant reminder that one is "just another name on the payroll."

Human cogs in a great machine. No chance to meet people, travel, or have exciting experiences. A long, slow, tiresome road that leads nowhere.

Always wondering what would happen in case of a "lay-off" or loss of job. No chance to express ability—no chance to get ahead. COULD there be a way out?

I Said "Good-bye" to It All After Reading This Amazing Book— Raised My Pay 700%!

Where Shall We Send Your Copy—Free?

WHEN a man who has been struggling along at a low-pay job suddenly steps out and commences to earn real money—$5,000, $7,500 or $10,000 a year—he usually gives his friends quite a shock. It's hard for them to believe he is the same man they used to know—but such things happen much more frequently than most people realize. Not only one, but HUNDREDS have altered the whole course of their lives after reading the amazing book illustrated at the right.

True, it is only a book—just seven ounces of paper and printers' ink—but it contains the most vivid and inspiring message that any ambitious man can read! It reveals facts and secrets that will open almost any man's eyes to things he has never even dreamed of!

Remarkable Salary Increases

For example, R. B. Hansen, of Akron, Ohio, is just one case. Not long ago he was a foreman in the rubber-curing room of a big factory at a salary of $160 a month. One day this remarkable volume, "The Key to Master Salesmanship," fell into his hands. And from that day on, Mr. Hansen clearly saw the way to say "good-bye" forever to low pay, long hours, and tiresome routine! Today he has reaped the rewards that this little volume placed within his reach. His salary runs well into the 5-figure class—actually exceeding $10,000 a year!

Another man, Wm. Shore of Lake Hughes California, was a cowboy when he sent for "The Key to Master Salesmanship." Now he is a star salesman making as high as $525 in a single week. L. H. Lundstedt, Chicago, read this free book—and raised himself from a stenographer to the head of a business with 600% increase in earnings. C. V. Champion of Danville, Illinois, raised his salary to over $10,000 a year and became President of his company in the bargain!

A Few Weeks—Then Bigger Pay

There was nothing "different" about any of these men when they started. None of them had any special advantages—although all of them realized that SALESMANSHIP offers bigger rewards than any other profession under the sun. But, like many other men, they subscribed to the foolish belief that successful salesmen are born with some sort of "magic gift." "The Key to Master Salesmanship" showed them that nothing could be farther from the truth! Salesmanship is just like any other profession. It has certain fundamental rules and laws—laws that you can master as easily as you learned the alphabet.

City and traveling sales positions are open in every line all over the country. For years, thousands of leading firms have called on the N. S. T. A. to supply them with salesmen. Employment service is free to both employers and members, and thousands have secured positions this way.

Free to Every Man

See for yourself WHY "The Key to Master Salesmanship" has been the deciding factor in the careers of so many men who are now making $10,000 a year. Learn for yourself the REAL TRUTH about the art of selling! You do not risk one penny or incur the slightest obligation. And since it may mean the turning point of your whole career, it certainly is worth your time to fill out and clip the blank below. Send it now!

National Salesmen's Training Association

Dept. M-703, N.S.T.A. Bldg., CHICAGO, ILL.

National Salesmen's Training Assn.,
Dept. M-703, N.S.T.A. Bldg.,
Chicago, Ill.

Without real or obligation, you may send me your free book, "The Key to Master Salesmanship."

Name .....

Address .....

City ..... State .....

Age ..... Occupation .....

For Craftsmen, Young and Old

Modernizing Your Basement - - - 102
How to Build a Teeter Stilt - - - 127
Radio Tube Makes Soldering Iron Holder 128
Doubling Surface Gauge Uses - - - 128
Amateur Electrician - - - - 130
Edited by Theodore Allen
Making a Set of Real Indian Puff Guns - 146
Construction of Storm Caves Profitable - 147
Home Workbench - - - - - 148
Edited by A. Neely Hall

Handikinks

Making Your Own Belt Dressing - - 60
Mirrors in Shop Speed Work - - - 66
Making Your Own Coil Springs - - 72
One Tire—Two Water Dishes - - - 73
Small Latch From Old Coil Parts - - 83
Speeding Cooking at High Altitudes - 106
Garden Accessories from Old Tubes - 106
Electric Bell Pull for Door - - - 107
Cork Support for Picture Frames - 107
Quickly Made Shoe Shiner - - - 107
Twisted Rice Paper Makes Pipe Cleaner - 107
Mooring Buoy for Boats - - - - 108
Razor Screw Driver - - - - 108
Simple Punching Bag Platform - - 108
Right Way to Fasten Cotter Pin in Bolt - 109
Shortening a Lamp Cord - - - - 109
Locating Lost Outboards - - - - 109
Teapot Makes Serviceable Light - 109
Blow Torch from Vacuum Sweeper - 110
Hinge Clamp Holds Bolt in Vise - 110
Wind Vane Figure Beats Drum - 110
A Miniature Gas Plant - - - - 111

To Interest the Radio Fan

Sparks from the Radio Editor - - 118
Edited by L. B. Robbins
Shift Loud Speaker for Better Music - 119
Caring for Storage Batteries - - - 120
Easily Made Rectifier - - - - 120
What Are the Short Waves Saying? - - 164
By L. B. Robbins

Items for the Household

A Mirror With Internal Light - - - 67
Cap and Mask Protect Swimmer's Ears - 73
Talking Grandfather's Clock - - - 76
Exerciser Rights Faulty Posture - - - 77
Electric Tie Iron - - - - - 114
Combination Stool and Dryer - - - 129
Novelty Bottle Opener - - - - 145
Running Water Keeps Milk Cool - - 145
Handy Play Box For Toys - - - 149
Screwdriver Has Non-Skid Blade - - 153

Aviation

"Wishbone" Anchor for Landing Dirigibles 66
First Parasol Type Fighting Plane - 83
Learn to Fly—We Pay the Way - - 84
Braley School Trains Winner - - - 86

Queer Gadgets Found on Brunelli's Plane - 87
Plane Talk Department - - - - 98
Edited by Major H. H. Arnold
Giant Junkers Air Liner - - - - 116
Hourmeter Times Hops - - - - 134
Fire Hazard Risk in Rocket Flight - - 144
Liquid Air Future Fuel for Airplane Motors 153
Parachute Jumper Imitates Flying Squirrel 173
Win Your Wings—See Page 84

For the Motorist

Liquid Air Fuel for Rocket Automobiles - 60
Circles World on Motorcycle - - - 72
Self-Adjusting Shock Absorber - - - 73
Rubber Case Saves Plugs - - - - 82
Lightest Racer Does 70 per hour - - 82
Something New on Wheels - - - 91
Radio Equipment for Autos - - - 115
"Cross-Eyed" Headlights - - - - 135
Parking Space on Downtown Roof - - 135
Auto Salesroom Built in Tiers - - 145
New Ford Accessories - - - - 152
Motor Mechanics Department - - - 162
Auto Crashed Into Wall in Tire Test - 175

The Shop Mail Box will be found this month on page 20.

New Mechanical Inventions

Outboard Motor Dredge - - - - 67
Inexpensive Adding Machine - - - 72
Pocket Kit for Guiding Woodsmen - - 76
Golf Practice Court - - - - 77
Photos on Untreated Metal - - - 83
Giant Totalizer - - - - - 114
Device Transfers Fuel Safely - - 129
Racket Idea Saves Restringing - - 134
Elevator Dust Drives Ford Motor - 134
Light Intensity Meter - - - - 144
Aero Engine of Radical Design - - 144
Paddle Wheel Canoe Run by Foot - - 145
Mechanics' Handy Combination - - 152
Lightest Life Boat - - - - - 152
Outboard Rat Exterminator - - - 153

Interesting Items

First Roller Bearing Locomotive - - 60
Dandelions Hoard Food Supply - - 66
Hypodermic Makes Meat Juicy - - 67
"Movie-of-U" in Six Minutes - - - 76
Motor Boat Merry-Go-Round - - - 77
Talkies Teach Medical Students - - 77
Diving Through Paper Targets - - 82
World's Largest Saxophone - - - 87
Senses of Blind Not More Acute - - 87
Illuminated Dog to Lead Blind - - 87
Smallest Gasoline Motor - - - - 114
Tea Room in Historic Tree - - - 115
Ornamental Broadcasting Kiosks - - 128
Auto Racer Carries Pet Lion - - - 129
Strange Objects Rained from Sky - - 153
Talking Movies Replace Stenographer - 161
Traveling Dressing Room for Movie Star - 161
Special Phone for Interpreters - - - 174
Longest Bridge in World - - - - 174

Do YOU Want a U.S. GOV'T. POSITION?

FOR MEN & WOMEN — AGE 18 to 55

INSIDE or OUTSIDE WORK - LOCAL or TRAVELING

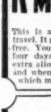
SPECIAL AGENTS (Investigators) Start $200 to $250 Month

Government Secret Service Work is one of the most fascinating and interesting branches of the service for men. These positions are located throughout the country and are both traveling and stationary. In addition to the high salaries that run up to $5000 yearly, all traveling expenses are paid while on the road.

RAILWAY MAIL JOB

$1900 to $2700 Year

This is a very fascinating position for men who like to travel. It gives you an excellent chance to see the country free. You are usually on duty four days and off duty four days, but are paid for full time. You receive extra allowance for hotel expense when away from home, and when you grow old you are retired with a pension which makes you comfortable the balance of your life.



RURAL and CITY CARRIERS

$1400 to $3000 Year

The Rural Mail Carrier is out in the open air and sunshine, easy, healthy work, short hours, with a large part of the day left to do as he pleases. Thousands of city positions available for those who prefer inside work, delivering mail in large office buildings. These positions available to both country and city people.

Many of these positions are ideal for men who like healthy outdoor work, where they can enjoy the forests and mountain trails. The duties vary from patroling our Borders and Forests, acting as Game, Fish, and Fire Warden, furnishing information to tourists, etc., to clerical work. You also receive an annual vacation with pay.

Over 900 Different Kinds of Positions

If you want a steady Government Position where strikes, hard times, politics, etc., will not affect you, where you can draw twelve months' pay every year, and then when you become old be retired on a pension for the balance of your life, get on Uncle Sam's Payroll. Stop worrying, enjoy your life. Pick the position you want, it belongs to you just as much as to anyone else. Then why not get it? It is all up to you! The positions described in this announcement are only a few of the many desirable ones obtainable. Fill out the coupon below, cut or tear it out, and mail *today*, and full particulars will be sent you immediately.

CUSTOMS INSPECTORS $2100 Year to Start

The duties are to check and inspect goods brought into this country by tourists, merchants, and manufacturers. Inspectors are required to levy the duties, etc., and see that Customs regulations are not violated. This is a very fascinating work with splendid salaries.

MEAT INSPECTORS $1500 to $1860 Year and Upward

This is a very interesting work. Farmers, butchers, or anyone with a knowledge of live stock, food products, meats, etc., are in line for one of these positions. The salaries and promotions are based on the ability and interest shown in this work. Both men and women are eligible.

BORDER PATROL GUARDS, FOREST and FIELD CLERKS, OTHER OUTDOOR POSITIONS

- ☐ Railway Mail Clerks
- ☐ Prohibition Investigator
- ☐ R.F.D. Carriers
- ☐ Special Agents
- ☐ U. S. Border Patrol
- ☐ Tel. Operator
- ☐ City Mail Carrier
- ☐ Meat Inspector
- ☐ Bookkeeper
- ☐ Customs Inspector
- ☐ U. S. Guards
- ☐ P. O. Clerk
- ☐ File Clerk
- ☐ General Clerk
- ☐ Matrons
- ☐ Watchman
- ☐ Skilled Laborer
- ☐ Postmasters
- ☐ Steno.—Typist
- ☐ Emigrant Inspector
- ☐ Seamstress
- ☐ Auditor
- ☐ Steno.—Secretary

INSTRUCTION BUREAU
Dept. 223, St. Louis, Mo.

Send me immediately FREE, full particulars about positions marked "X". Also your big list of other positions obtainable, salaries, locations, how to qualify, opportunities, etc.

NAME .....

ADDRESS .....

PICK THE JOB YOU WANT AND MAIL THIS COUPON NOW

"There's one man we're going to keep"

"ED WILSON, there, is one of the most ambitious men in the plant. I notice that he never fools away his spare time. He studies his International Correspondence Schools course every chance he gets.

"It's been the making of him, too. He hasn't been here nearly so long as Tom Downey, who was laid off yesterday, but he knows ten times as much about this business.

"I'm going to give him Tom's job, with a raise in salary. He's the kind of man we want around here."

How do you stand in your shop or office? Are you an Ed Wilson or a Tom Downey? Are you going up? *Or down?*

No matter where you live, the International Correspondence Schools will come to you. No matter what your handicaps or how small your means, we have a plan to meet your circumstances. No matter how limited your previous education, the simply-written, wonderfully-illustrated I. C. S. textbooks make it easy to learn.

This is all we ask: Without cost, without obligating yourself in any way, put it up to us to prove how we can help you. Just mark and mail this coupon for full particulars.

INTERNATIONAL CORRESPONDENCE SCHOOLS, Box 2323-F, Scranton, Penna.
"The Universal University"

Without cost or obligation on my part, please send me a copy of your 48-page booklet, **"Who Wins and Why,"** and tell me how I can qualify for the position, or in the subject, *before* which I have marked an X:

BUSINESS TRAINING COURSES

- ☐ Business Management
- ☐ Industrial Management
- ☐ Personnel Management
- ☐ Traffic Management
- ☐ Accounting and C. P. A. Coaching
- ☐ Cost Accounting
- ☐ Bookkeeping
- ☐ Secretarial Work
- ☐ Spanish ☐ French
- ☐ Salesmanship
- ☐ Advertising
- ☐ Business Correspondence
- ☐ Show Card and Sign Lettering
- ☐ Stenography and Typing
- ☐ English
- ☐ Civil Service
- ☐ Railway Mail Clerk
- ☐ Mail Carrier
- ☐ Grade School Subjects
- ☐ High School Subjects
- ☐ Illustrating ☐ Cartooning
- ☐ Lumber Dealer

TECHNICAL AND INDUSTRIAL COURSES

- ☐ Architect
- ☐ Architectural Draftsman
- ☐ Building Foreman
- ☐ Concrete Builder
- ☐ Contractor and Builder
- ☐ Structural Draftsman
- ☐ Structural Engineer
- ☐ Electrical Engineer
- ☐ Electrical Contractor
- ☐ Electric Wiring
- ☐ Electric Lighting
- ☐ Electric Car Running
- ☐ Telegraph Engineer
- ☐ Telephone Work
- ☐ Mechanical Engineer
- ☐ Mechanical Draftsman
- ☐ Machine Shop Practice
- ☐ Toolmaker
- ☐ Patternmaker
- ☐ Civil Engineer
- ☐ Surveying and Mapping
- ☐ Bridge Engineer
- ☐ Gas Engine Operating
- ☐ Automobile Work
- ☐ Aviation Engines
- ☐ Plumber and Steam Fitter
- ☐ Plumbing Inspector
- ☐ Foreman Plumber
- ☐ Heating and Ventilation
- ☐ Sheet-Metal Worker
- ☐ Steam Engineer
- ☐ Marine Engineer
- ☐ Refrigeration Engineer
- ☐ R. R. Positions
- ☐ Highway Engineer
- ☐ Chemistry
- ☐ Pharmacy
- ☐ Mining Engineer
- ☐ Navigation ☐ Assayer
- ☐ Iron and Steel Worker
- ☐ Textile Overseer or Supt.
- ☐ Cotton Manufacturing
- ☐ Woolen Manufacturing
- ☐ Agriculture
- ☐ Fruit Growing
- ☐ Poultry Farming
- ☐ Mathematics
- ☐ Radio

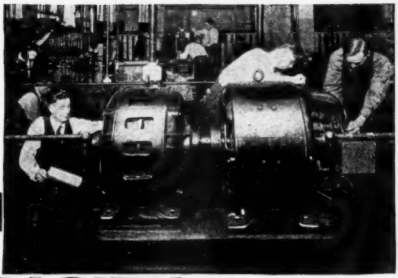
Name.....

Street Address.....

City.....State.....Occupation.....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

The Old Way



ELECTRICITY Becomes Amazingly Easy When Taught Without Books *or* Lessons IN 90 DAYS

Why work at dull, uninteresting jobs that will never pay you more than $35, $40 or perhaps $50 a week? Make up your mind NOW and become a master of electricity! Train in 12 easy weeks to hold down the kind of a job that pays $60 and up a week, and which creates a constant demand for your services nearly any place in the world!

No Books -- No Classes

Electricity, as taught in the Great Shops of Coyne, is surprisingly easy to grasp. That's because we use no books. You learn by doing actual, practical experimenting on big, electrical machinery—finest outlay in the country. You learn by doing—and you learn from the ground up.

Not a CORRESPONDENCE School

Experts work right along with you every step of the way. You get personal attention—you are trained not by books but on actual electrical machinery. The COYNE WAY gives you real, sound knowledge that fits you to do practical electrical work in all its branches.

Now in Our NEW HOME . . .

This is our new, fireproof, modern home wherein is installed thousands of dollars' worth of the newest and most modern Electrical Equipment of all kinds. We now have the largest amount of floor space devoted to the exclusive teaching of practical electricity in the world. Every comfort and convenience has been arranged to make you happy and contented during your training.

NO EXPERIENCE OR ADVANCED EDUCATION NECESSARY

You don't need one days' previous electrical experience or any advanced education to master electricity the Coyne way. Some of our most successful graduates never went farther than the 8th grade.

EARN WHILE YOU LEARN

By special arrangement, our employment department helps students locate part-time work, if they want to earn while they learn. And after graduation we give them the benefit of our FREE EMPLOYMENT Service for Life. Every week we secure many positions for Coyne men.

GET FREE BOOK

Write today for my big book on electricity with over 150 photographs. Learn what great opportunity Coyne Training opens up for you. Also get full details of my Big 5-Special Offer. No obligation. Mail the coupon now.

INCLUDED

If You Act Now

1. **R. R. Fare** will be refunded upon enrollment from any point in the U. S. to Chicago.
2. **Aviation** my big new Aviation Electrical course included at no extra charge.
3. **Radio** course included absolutely without any extra charge.
4. **Auto** course, covering truck and tractor electricity

SEE COUPON!

FREE BOOK *Coupon*

H. C. LEWIS, President
COYNE ELECTRICAL SCHOOL, Dept. 60-53
500 S. Paulina St., Chicago, Ill.

Please send me your free catalog on Electricity and details of your railroad fare allowance and extra courses. No obligation on my part.

Name .....

Address .....

City ..... *State* .....

COYNE ELECTRICAL SCHOOL
H. C. LEWIS, Pres. Established 1899
500 S. Paulina Street Dept. 60-53 Chicago, Ill.

R. T. I. R. T. I. QUALIFIES YOU TO MAKE MONEY AND ITS SERVICE KEEPS YOU UP-TO-THE-MINUTE ON THE NEWEST DEVELOPMENTS IN RADIO, TELEVISION AND TALKING PICTURES R. T. I.

Easy to Get into this BIG Money Making Work
$60 to $125.00 A WEEK Radio Operator
$8 to $15.00 A DAY Servicing and Repairing Radio Sets
$5000.00 A YEAR AND UP Radio Engineer for Broadcasting Station
$85.00 A WEEK Installing and Repairing Talking Picture Equipment

GOOD JOBS Right at Your Finger Tips

WHEN YOU ARE R.T.I. TRAINED IN

RADIO-TELEVISION-Talking Pictures

BIG PAY JOBS! SPARE TIME PROFITS! A FINE BUSINESS OF YOUR OWN! They're all open to you and other live wire men who answer the call of RADIO. The fastest growing industry in the world needs more trained men. And now come Television and Talking Movies—the magic sisters of Radio. Will you answer this call? Will you get ready for a big pay job NOW and step into a BIGGER ONE later on? You can do it EASILY now.

R. T. I. Home Training Puts You in This Big Money Field

Radio alone, pays over 200 MILLION DOLLARS a year in wages in Broadcasting, Manufacturing, Sales, Service, Commercial Stations and on Board the big sea going ships and many more men are needed. Television and Talking Movies open up other vast fields of money-making opportunities for ambitious men. Get into this great business that is live, new and up-to-date, where trained service men easily earn $40 to $50 per week, and trained men with experience can make $75 a week and up.

Easy To Learn At Home—In Spare Time

Learning Radio the R. T. I. way with F. H. Schnell, the "Ace of Radio" behind you is EASY, INTERESTING, really FUN. Only a few spare hours are needed and lack of education or experience won't bother you a bit. We furnish all necessary testing and working apparatus and start you off on practical work you'll enjoy—you learn to do the jobs that pay real money and which are going begging now for want of competent men to fill them.

FRED H. SCHNELL
Chief of R. T. I. Staff
Twenty years of Radio Experience. First to establish two-way amateur communication with Europe. Former Traffic Manager of American Radio Relay League. Lieut Commander U. S. N. R. Inventor and Designer Radio Apparatus. Consultant Radio Engineer. Now in charge of R. T. I. Radio Training—and you will like his friendly manner of helping you realize your ambition.

Amazingly Quick Results

You want to earn BIG MONEY, and you want some of it QUICK. R. T. I. "Three in One" Home Training—Radio-Television-Talking Movies—will give it to you, because it's easy, practical, and is kept right up-to-date with last minute information. In a few weeks you can be doing actual Radio work, making enough EXTRA MONEY to more than pay for your training. In a few short months you can be all through—ready to step into a good paying job or start a business of your own. A BIG JOB—BIG MONEY—A BIG FUTURE. There is no other business in the world like it.

Investigate—Send For R. T. I. Book Now

Don't waste a minute. Find out what the great Radio industry, which has grown faster than the Automobile and Motion Picture business, has to offer you. Find out what other men are earning. SEE HOW EASILY YOU CAN GET STARTED. Get the facts about Radio, Television and the Talking Pictures, first hand, in the big R. T. I. FREE BOOK. Learn what this R. T. I. "Three in One" Home Training can do for you. Mail the coupon for FREE BOOK NOW.

RADIO & TELEVISION INSTITUTE
Dept. 686
4806 St. Anthony Court Chicago

R. T. I. R. T. I. TRAINS YOU AT HOME FOR A GOOD JOB OR A PROFITABLE PART TIME OR FULL TIME BUSINESS OF YOUR OWN

R.T.I. Training Brings Big Jobs Like These!

$500 EXTRA MONEY IN 2 MONTHS

Your radio course has enabled me to earn over $500 in two months. This is all spare time work, as I have a permanent position with my father in our store. I give you all the credit for the above.
—J. NOFFSINGER,
R. 1, Box 37, Greenville, Ky.

MAKES $25 A DAY

I make as high as $25.00 per day and have made $600.00 in 2 months from Radio work. That's not so bad when I'm only 19 and in a small town. You did all you said you would and much more.—FLOYD KNISELY,
Box 91, St. Joe, Ind.

SALARY RAISED 33 1-3

I am now Radio Service Manager for the H. N. Knight Supply Co., distributors for Eveready Radio Receivers in Oklahoma, and Texas Panhandle, with an increase in salary of about 33 1-3% since I enrolled with your school.
—EARL P. GORDON, 618 E. 6th St.
Oklahoma City, Okla.

RADIO & TELEVISION INSTITUTE
Dept. 686, 4806 St. Anthony Court, Chicago

Send me Free and prepaid your BIG BOOK "Tune In On Big Pay" and full details of your three-in-one Home Training (without obligating me in any way).

Name.....

Address.....

City..... State.....

McSweeny's Amazing New Ways to a BIG PAY Job

Training takes you out of the low pay ordinary jobs. It makes you independent of hard times, strikes, shut downs, because there is always a demand for the trained man. Learn how easily and quickly you can get out of the low pay class by going into Electricity, Automotive or Aviation the McSweeny way.

ELECTRICITY | AUTOMOTIVE | AVIATION

Learn to control, master and apply this magical juice that rules the universe. Be a McSweeny trained electrical expert.

Every motor propelled vehicle—Automobiles, Trucks, Tractors require constant service. The trained Automotive Mechanic is always in demand.

Learn to master the mechanics of this great new fast growing industry where there is a big need for trained Aviation men.

You Learn by Doing on Real Equipment in Only 8 to 12 Weeks

The McSweeny Shop Plan is the PRACTICAL way to learn Electricity, Automotive or Aviation Mechanics. You learn right here in the McSweeny Shops, on REAL equipment. One entire floor of the school building is devoted entirely to electrical instruction. Another floor is given over entirely to automotive teaching. Here in 8 to 12 weeks you can complete the training in any one of these high pay fields that would take you up to two years by correspondence or through boresome books. You are taught by actual doing—no theory—no guesswork—no puzzling blue-prints. Get out of the rut. Be a McSweeny Trained Man and earn $40 to $150 weekly.

No Books--No Classes

In the McSweeny Electrical Shops you use real tools instead of books. Your lessons are given on regulation electrical equipment. Here are switch boards, generators, motors. You get first hand knowledge of A.C. and D.C. armature winding, house wiring, splicing, automobile and radio electrical systems and batteries. You are given everything you need to become an electrical expert at big pay. In the automotive and aviation departments are real motors for automobiles, trucks, tractors and airplanes. You work on these motors as well as other parts and learn how to do the right thing in the right way. Expert instructors work shoulder-to-shoulder with you and guide you at every step.

Guarantee of Satisfaction

You take no risk. I am so positive that you will make a big success after taking my training, that I guarantee to train you until you are permanently placed in a good job at good pay. Mail coupon for big FREE Book and remarkable tuition offer if you are over 16 years of age. Act today.

J. H. McSweeny.

McSWEENY SCHOOLS
ELECTRICAL
AUTOMOTIVE
AVIATION

Dept. C-11-J Chester at 30th St., Cleveland, Ohio

Mail This Coupon for FREE Book

J. H. McSweeny, Pres.,
McSWEENY SCHOOLS,
Dept. C-11-J, Chester at 30th St., Cleveland, Ohio.

Without cost or obligation, send me your big FREE book and full details of your special tuition offer. (Check school interested in.)

☐ Electrical ☐ Automotive ☐ Aviation

Name .....

Street .....

Town ..... State ..... Age .....

WHY 22,000 Ambitious Young Men selected NATIONAL "THE SCHOOL OF SHOPS" to learn ELECTRICITY

NATIONAL LOCATED IN LOS ANGELES

Come to the World's finest City and learn Electricity in the World's finest Trade school. Enjoy life in this fascinating garden-spot while learning a fascinating profession that will prepare you for steady, profitable employment.

NATIONAL PERSONALIZED INSTRUCTION

Competent, experienced instructors teach you at National . . . not by correspondence or by dry lessons . . . but by actually showing you how to do electrical work on full sized electrical equipment of every modern type.

NATIONAL ESTABLISHED 25 YEARS

This is a million dollar institution where 22,000 students have become graduates and entered the high salaried electrical industry, where there is a constant demand for the graduates of this approved "School of Shops."

NATIONAL TEACHES YOU COMPLETELY

Here you learn EVERY branch of Electricity . . . to be properly and thoroughly equipped for practically any good paying position in the gigantic Electrical industry where millions of dollars are spent each year for new development.

Send TODAY for this big ELECTRICAL BOOK

NATIONAL "THE SCHOOL OF SHOPS"

This practical, shop system enables you to start anytime . . . previous experience or advanced education are not necessary. You learn step by step working in the National shops under the personal direction of experienced instructors

NATIONAL NEWEST 1930 EQUIPMENT

Thousands of dollars worth of modern equipment for you to learn with . . . practically every standard type of motors, generators, transformers, power plant switch board equipment, meters, batteries. Every thing you need.

NATIONAL PREPARES YOU FOR A POSITION

When you finish this complete course you are ready to accept a good paying position. You are fully equipped with a complete knowledge of electrical work . . . prepared to make good and start up the electrical ladder of success.

NATIONAL LIFE EMPLOYMENT SERVICE FREE

Unlimited, guaranteed employment service to graduates . . . and part time work to cover student living expenses. Send today for free book of information . . . and for details about National's ELECTRICAL COURSE OUTFIT, FREE OF EXTRA COST.

free

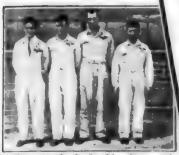
NATIONAL ELECTRICAL SCHOOL
Dept. 305 E.O. 4006 Figueroa St.
LOS ANGELES, CALIFORNIA
Please send me your Big FREE illustrated Book of Electrical Opportunities, showing how I can get a FREE Electrical Course Outfit and quickly qualify for a Big Pay Electrical job.

Name _____
Address _____ Age _____ City _____ State _____

NATIONAL—THE APPROVED "SCHOOL OF SHOPS"

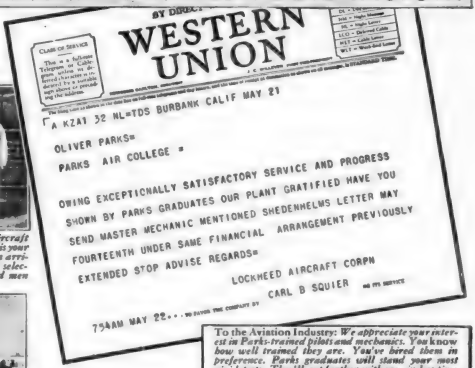
PARKS-trained men make good

"SEND US ANOTHER" WIRES PLANE FACTORY



Back in April, the Lockheed Aircraft Corporation wired to Parks: "This your authority offer employment upon arrival Burbank four students your selection." These four Parks-trained men were selected.

One month later, in May, came the telegram reproduced to the right, and another Parks-trained man gets ready to take a good-paying position with one of aviation's leaders.



BY DIRECT

WESTERN UNION

CLASS OF SERVICE

This is a full-rate Telegram or Cablegram unless its deferred character is indicated by a suitable sign above or preceding the address.

A KZA1 32 NL=TDS BURBANK CALIF MAY 21

OLIVER PARKS=

PARKS AIR COLLEGE =

OWING EXCEPTIONALLY SATISFACTORY SERVICE AND PROGRESS SHOWN BY PARKS GRADUATES OUR PLANT GRATIFIED HAVE YOU SEND MASTER MECHANIC MENTIONED SHEDENHELMS LETTER MAY FOURTEENTH UNDER SAME FINANCIAL ARRANGEMENT PREVIOUSLY EXTENDED STOP ADVISE REGARDS=

LOCKHEED AIRCRAFT CORPN

CARL B SQUIER

754AM MAY 22... TO FAVOR THE COMPANY BY

To the Aviation Industry: *We appreciate your interest in Parks-trained pilots and mechanics. You know how well trained they are. You've hired them in preference. Parks graduates will stand your most rigid tests. They'll get farther with you, in less time—and save you money. You can prove this!*

EVERY week they leave us—well-trained, confident—eager to take up their good-paying work as pilots and mechanics. Every week they come to us—wondering if Parks is *really* the world's greatest aviation school. And what do they find? A college that even surpasses their imagination, equipped without regard for expense—the pick of the country's skilled instructors—every hour packed with interest, flying, "tinkering," studying — clean, commodious living quarters — ample recreation facilities, good food, good fellows, and a career ahead!

If you have a spark of ambition—and vision enough to see the vast possibilities aviation is opening up—you belong at Parks—*and now is the time!* Every man with us today was "trying to decide" a few short months ago. Every one of them is further ahead than you are. The days are precious. Aviation can't succeed without well-trained men, and Parks-trained men are 'way out in front in ability, skill, and experience. Join today—"tomorrow" never comes. Mail the coupon.

Parks Air College was one of the first to be licensed by the U. S. Department of Commerce as a fully accredited transport school

PARKS AIR COLLEGE

DIVISION OF DETROIT AIRCRAFT CORPORATION

980 Parks Airport

EAST ST. LOUIS ILLINOIS

. . COUPON . .

PARKS AIR COLLEGE,
980 Parks Airport, East St. Louis, Ill.

Without cost or obligation to me, please mail your illustrated catalog.

Name .....

Street address .....

City ..... State .....

Occupation ..... Age .....

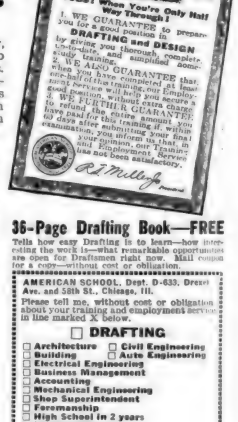
I am interested in
Pilot's Course ☐
Mechanic's Course ☐

We have placed machinists, carpenters, masons, plumbers, railroad men, office clerks, farmers and even laborers in fine Drafting Jobs under this plan. Mail coupon for details of our remarkable offer.

Men Who Work With Their Hands

Make the Best

DRAFTSMEN



—and we'll back them with this EMPLOYMENT CONTRACT

We are looking for more ambitious young fellows with factory, building-trade or any other kind of mechanical experience to prepare for and help place in well-paid Drafting positions. Such men, we find, are unusually successful as Draftsmen, because they know how things are done, and that's a priceless asset to the man who makes the blueprint plans. Get in touch with me and I'll tell you how you can cash in on your entire past mechanical experience.

"I have landed a job with the Pacific Tel. and Tel. Co. in Seattle, and I must say that I am greatly indebted to the American School for my success. You have done all that you promised in helping me obtain employment."
T. C. White
Seattle, Wash.

"I have obtained a position as a junior draftsman with the Muncie Oil Engine Co., and so far like the work real well. I appreciate your aid in obtaining this position very much."
H. D. Burnham
Muncie, Ind.

Drafting Is Logically Your Next Move!

Of course you realize the biggest handicap to mechanical work is that you're limited in earning capacity to the output of your two hands, as long as you live. Even the skilled mechanic earning $50 to $60 a week has reached his limit. He can never earn more and when he gets old he will earn **less**. So I don't blame any man for wanting to get away from this futureless outlook. For wanting to get into something where he can use his **head** as well as his hands—where he will be paid for what he **knows**, instead of only for what he **does** . . . You know enough about blueprints to understand that PLANS govern every move in factory and construction job. The Draftsman who makes them is several jumps ahead of the workman who follows them. And so I want you to know that DRAFTING is a logical, natural PROMOTION from mechanical and building work—better-paid, more interesting—just the kind of work you'd enjoy doing.

Get Our NO-RISK PLAN

The WAY to a fine Drafting job for **you**—is easier than you think. It takes no "artistic talent" or advanced education. Thousands of men no smarter than you, with no more education or ability, have learned it quickly and you can, too. With the co-operation of some of the biggest employers and engineers in the U. S., we have worked out a plan to prepare you for Drafting work in your spare time at home—then to help you get a fine position where you're **only half** way through the course. Mail the coupon and we'll be glad to tell you all about this lifetime chance.

THE AMERICAN SCHOOL
Dept. D-633, Drexel Ave. and 58th St., Chicago, Ill.

36-Page Drafting Book—FREE

Tells how easy Drafting is to learn—how interesting the work is—what remarkable opportunities are open for Draftsmen right now. Mail coupon for a copy—without cost or obligation.

AMERICAN SCHOOL, Dept. D-633, Drexel Ave. and 58th St., Chicago, Ill.

Please tell me, without cost or obligation about your training and employment service in line marked X below.

☐ **DRAFTING**

☐ Architecture	☐ Civil Engineering
☐ Building	☐ Auto Engineering
☐ Electrical Engineering	
☐ Business Management	
☐ Accounting	
☐ Mechanical Engineering	
☐ Shop Superintendent	
☐ Foremanship	
☐ High School in 2 years	
☐ Structural Steel	

Name _____

St. No. _____

City _____ State _____

Age _____ Occupation _____

There is a JOB for You Here...

Get Into AVIATION

MAJOR
R. L. Rockwell

Will Train You AT HOME, and Until You

Get a Job Paying You $300 to $400 a month

Major Rockwell—famous world war flyer, is offering to train a limited number of ambitious men who want to get into aviation and get one of the big pay jobs that aviation offers.

JUST 12 SHORT WEEKS

All you have to do is devote about an hour or two a day to my Home Study Extension Course and in 12 weeks you will be mastering the principles of Ground Training and be prepared to qualify for and accept a big pay job in this branch of Aviation. If you want to fly, my Home Study Course teaches you the principles of flight. When you have completed the ground training I will arrange for you to take your flying instructions at any licensed airport near your home at special reduced rates. Or if you want you can come here to Dayton and get training at one of the finest and best equipped airports in America. No matter where you learn to fly you can qualify for a pilot's license and a high pay job in passenger lines, mail service, and other important branches of flying.

Advance Education or Experience Unnecessary

You don't need a high education to master my course. My home course is thorough and complete. Everything is so clearly explained, with easy-to-understand text and pictures, that in a few short months you will be able to grasp every fundamental principle of Aviation ground work and get a start in Aviation quickly. For any important aviation job paying $300 to $400 a month, My Home Study Course will give you all the knowledge necessary to pass the government's written examination for a license.

How I Help You Get Your Job

Because of my experience in Aviation and knowledge of the work, I am in touch with large employers of trained aviation men who are constantly seeking help. Thus I am able to help my graduates get the aviation job they want at big pay. These employers prefer Rockwell Trained Men.

Money-Back Agreement

I am so sure that you can learn Aviation with my help and step into a big aviation job that if you are not satisfied when you have finished my course, I agree to return every penny of your tuition. Read my money-back agreement. Act now while my special offer lasts. Rush this coupon to me for a copy of my famous free book.

MAJOR ROB'T L. ROCKWELL
The Dayton School of Aviation
Desk W-2 Dayton, Ohio

My Book Explains All ... Sent FREE ... MAIL COUPON

Major Rob't L. Rockwell
The Dayton School of Aviation
Desk W-2 Dayton, Ohio.

Dear Major: Please send me FREE and without obligation a copy of your famous book on Aviation; the details of your no-risk plan; also your special tuition offer.

Name .....

Address .....

Town..... State..... Age.....

Draftsman's Pocket Rule FREE

MERELY COPY THIS SKETCH

You will GET THESE TOOLS AT ONCE as my student!

NEW FREE PAY-RAISING PLAN

Draftsmen Needed In:

AUTO WORK
The automobile industry is one of the greatest in America. Thousands of draftsmen needed. I'll train you for the work.

ELECTRICITY
Electricity is the coming motive force of the world. Draftsmen are needed in every department of this fascinating work. I'll train you at home. Get a job here.

AVIATION
Aviation is just in its infancy. It is bound to expand to enormous proportions. Draftsmen are essential to it. I'll train you quickly at home.

MOTOR BUS WORK
Motor bus building and motor bus transportation have become leading world industries. Hundreds of draftsmen engaged in the work. I'll show you the way.

BUILDING WORK
There will always be building. No structure can be erected without plans drawn by draftsmen. I'll make you an architectural draftsman at home.

If you are 16 or more make sketch of airplane and send it to me at once. I will mail you the Draftsman's Pocket Rule and "My Pay-Raising Plan"—Free. See also the Pay-Raising tools—fine quality, genuine imported instruments which I send you immediately when you become my student. No finer tools than these are made for practical drafting work.

Age or Lack of Education No Drawback

You do not need previous experience. You do not need to be a high school graduate. My practical, home study course gives you just the kind of training you need to become successful, during only your spare time.

I Train You At Home

My practical working method makes every step in learning drafting as clear as a moving picture. That's why I train you as fast to be a draftsman.

I Prove Big Pay

I can prove that John Savadge, trained by me, makes $300 a month. Earl J. Dupree, trained by me, refused $600 a month because he makes more in his own business. A. H. Bernier, trained by me, earns $7,000 to $9,000 a year. Arthur Dewalt, trained by me, makes more than $400 a month. D. C. Stroop, trained by me, makes $475 a month. L. V. Broughten, trained by me, makes $300 a month.

Earn While You Learn

You can start earning extra money a few weeks after beginning my training. I give you special work and tell you how to make money.

Employment Service

After training you I help you to get a job without charging you a cent for this service. Employers of draftsmen come to me for men because they know that men I train make good.

MAIL COUPON ~ GET FREE RULE

ENGINEER DOBE,
1951 Lawrence Ave., Div. 23-56 Chicago

Here's the sketch. Send me free rule; also send me free of all cost book "My Pay-Raising Plan,"—how to earn money while learning and proof of big money paying positions.

Name ..... Age .....

Address .....

Post Office ..... State .....

"I will train you at home."
Engineer Dobe

If You Earn Less Than $70 a Week MAIL THIS COUPON

Act Now! Before You Put this Magazine Down, mail Airplane sketch. Let me send you free Draftsman's Pocket Rule and "My Pay-Raising Plan." Remember Draftsmen are needed everywhere. That's the kind of profession to get into. Get started now. Get into a better position, paying a good straight salary the year around.

ENGINEER DOBE,
1951 Lawrence Ave., Div. 23-56 Chicago, Ill.

I will train you at home to fill a BIG PAY Radio Job!

If you are earning a penny less than $50 a week, send for my book of information on the opportunities in Radio. It is free. Clip the coupon NOW. Why be satisfied with $25, $30 or $40 a week for longer than the short time it takes to get ready for Radio.

Radio's growth opening hundreds of $50, $75, $100 a week jobs every year

In about ten years Radio has grown from a $2,000,000 to a $1,000,000,000 industry. Over 300,000 jobs have been created. Hundreds more are being opened every year by its continued growth. Men and young men with the right training—the kind of training I give you—are needed continually.

You have many jobs to choose from

Broadcasting stations use engineers, operators, station managers and pay $1,800 to $5,000 a year. Manufacturers continually need testers, inspectors, foremen, engineers, service men, buyers, for jobs paying up to $15,000 a year. Shipping companies use hundreds of Radio operators, give them world wide travel at practically no expense and a salary of $85 to $200 a month. Dealers and jobbers employ service men, salesmen, buyers, managers, and pay $30 to $100 a week. There are many other opportunities too.

So many opportunities many N. R. I. men make $5 to $25 a week extra while learning

The day you enroll with me I'll show you how to do 10 jobs, common in most every neighborhood, for spare time money. Throughout your course I send you information on servicing popular makes of sets; I give you the plans and ideas that are making $200 to $1,000 for hundreds of N. R. I. students in their spare time while studying.

Talking Movies, Television, Wired Radio are also included

Radio principles as used in Talking Movies, Television and home Television experiments, Wired Radio, Radio's use in Aviation, are all given. I am so sure that I can train you satisfactorily that I will agree in writing to refund every penny of your tuition if you are not satisfied with my Lessons and Instruction Service upon completing.

64-page book of information FREE

Get your copy today. It tells you where Radio's good jobs are, what they pay, tells you about my course, what others who have taken it are doing and making. Find out what Radio offers you, without the slightest obligation. ACT NOW.

J. E. SMITH, President
National Radio Institute Dept. OKH,
Washington, D. C.

$100 a week

"My earnings in Radio are many times greater than I ever expected they would be when I enrolled. They seldom fall under $100 a week."
E. E. WINBORNE,
1414 W. 48th St.,
Norfolk, Va.

Jumped from $35 to $100 a week

"Before I entered Radio I was making $35 a week. Last week I earned $110 servicing and selling Radios. I owe my success to N. R. I."
J. A. VAUGHN
3715 S. Kingshighway,
St. Louis, Mo.

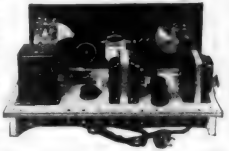
$500 extra in 6 months

"I find I made $500 from January to May in my spare time. My best week brought me $107. I should have taken it long ago."
HOYT MOORE
R. R. 3, Box 919,
Indianapolis, Ind.

I will give You my new OUTFITS of RADIO PARTS for a home Experimental Laboratory

You can build over 100 circuits with these outfits. You build and experiment with the circuits used in Crosley, Atwater-Kent, Eveready, Majestic, Zenith, and other popular sets. You learn how these sets work, why they work, how to make them work. This makes learning at home easy, fascinating, practical.

Back view of 5 tube Screen Grid A. C. set—only one of many circuits you can build.



I am and the of many in one year and less Find out about this quick way to

Radio Needs Trained Men

FILL OUT AND MAIL THIS COUPON

J. E. SMITH, President,
National Radio Institute, Dept. O
Washington, D. C.
Dear Mr. Smith: Send me your book. This request does not obligate me.

Name .....

Address .....

City .....State .....

PATE

Protect Your Ideas

Take the First Step Today

If you have a useful, practical, novel idea for any new article or for an improvement on an old one, you should communicate with a competent Registered Patent Attorney AT ONCE. Every year thousands of applications for patents are filed in the U. S. Patent Office. Frequently two or more applications are made for the same or substantially the same idea (even though the inventors may live in different sections of the country and be entirely unknown to one another). In such a case, the burden of proof rests upon the last application filed. Delays of even a few days in filing the application sometimes mean the loss of a patent. So lose no time. Get in touch with me at once by mailing the coupon on the opposite page.

Prompt, Careful, Efficient Service

This large, experienced organization devotes its entire time and attention to patent and trade mark cases. Our offices are directly across the street from the U. S. Patent Office. We understand the technicalities of patent law. We know the rules and requirements of the Patent Office. We can proceed in the quickest, safest and best ways in preparing an application for a patent covering your idea. Our success has been built on the strength of careful, efficient, satisfactory service to inventors and trademark owners located in every state in the Union.

NO CHARGE for Information

On How to Proceed

The booklet shown here contains valuable information relating to patent procedure that every inventor should have. And with it I will also send you my "Record of Invention" form on which you can sketch your idea and establish its date before a witness. Such evidence may later prove valuable to you. Simply mail the coupon and I will send you the booklet, and the "Record of Invention" form, together with detailed information on how to proceed and the costs involved. Do this NOW. No need to lose a minute's time. The coupon will bring you complete information entirely without charge or obligation.

My Offices Just Across Street From U. S. Pat. Office

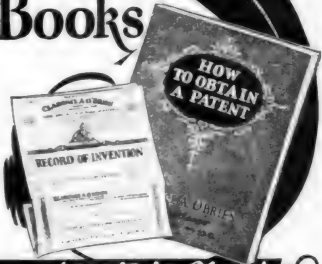
NTS

Above is a view of my drafting and specification offices where a large staff of experienced experts are in my constant employ. All drawings and specifications are prepared in my offices.

Inventors Write for these Free Books

Strict Secrecy Preserved

All communications, sketches, drawings, etc., are held in strictest confidence in strong, steel, fireproof files, which are accessible only to authorized members of my staff. Feel free to write me fully and frankly. It is probable that I can help you. Highest references. But FIRST—clip the coupon and get my free book. Do THAT right now.



Clarence A. O'Brien

Registered Patent Attorney

Member of Bar of: Supreme Court of the United States; Court of Appeals, District of Columbia; Supreme Court, District of Columbia; United States Court of Claims.
Practice confined exclusively to Patents, Trademarks and Copyrights

Clip this Coupon *and* Mail it *Now!*

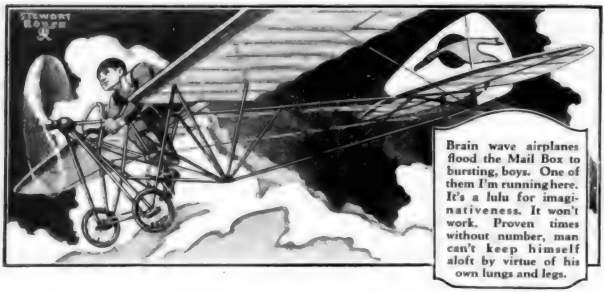
CLARENCE A. O'BRIEN, *Registered Patent Attorney*
317-L Security Savings and Commercial Bank Building
WASHINGTON, D. C.
(or, Suite 1106 Woolworth Bldg., Dept. C-3, New York City)

Please send me your free book, "How to Obtain a Patent," and your "Record of Invention" form without any cost or obligation on my part.

Name .....

Address .....

(Important—Write or print plainly, and address office nearest you)



Brain wave airplanes flood the Mail Box to bursting, boys. One of them I'm running here. It's a lulu for imaginativeness. It won't work. Proven times without number, man can't keep himself aloft by virtue of his own lungs and legs.

Andy's Shop Mail Box

Barge in here, boys! This month has been hot and heavy for scandal, and from stem to stern Andy's load of lead fairly stutters with news you'll want to hear—right off the bat!

NEWS nuggets: A west coast M-M fan has flown an Anzani type Parasol with a Johnson 32 h.p. Seahorse outboard motor conversion. Sam Rabl is working on that kind of a ship for M-M now. Below is a Parasol, home-built by Robert Dumas, recent contest winner. Orthodox, it flies well. Atta boy, Bobbo!

* * *

I win the jack-pot, Gang. Remember the straw ballots? Floods of them came in, and I thank everybody. Want to know what they showed, those votes? In order named, planes, how-to-builds, gliders, motor mechanics, stand graded as to reader's choice. After that the Amateur Electrician colyoom was popular. Then came lathe and model projects. Running neck and neck, next come home workshop stuff, chemistry articles, science and physics, model airplanes, boat building yarns. Magic was weakest of all. Guess the Association of Magickers, who try to put the soft pedal on all "secrets" of magic are going to be satisfied in the future, because I won't let the boys run any more sleight of hand bologney. You observe I have nothing up my sleeve.

* * *

The model boat fever has bitten hundreds. In answer to requests for litrachoor on small engines, boilers, hulls, hardware and general rhubarb for the dolling up of model boats, I refer you to Spon & Chamberlain, 120 Liberty St., N.Y.C. They handle model boat books.

Robert Dumas, recent contest winner, built this ship.

(Continued on page 24)

"Hard times" didn't touch these men*

They had LaSalle Job Insurance

WE'VE been going through one of those periods when men outnumber available jobs.

Lots of fellows riding along on the crest of the wave, thinking things would last forever, have found out differently.

But wherever an individual has had something worth while to offer —so called "hard times" haven't touched him. Many men have increased their earnings—bettered their positions when other fellows found themselves on the street.

And it hasn't been luck—or chance —or circumstance.

The trained man—like the rock in a storm—isn't affected by times or conditions.

Listen to these facts:

"When most of our old men were laid off, I was promoted"

For instance, there was our Industrial Management student in a Middle-West aircraft plant who found that his training and his use of it in his daily work paid quickly. He writes, *"During these bad times when most of our old men were laid off, I was promoted. Now whenever I meet one of the old gang and he asks me about my 'pull,' I simply show him my LaSalle membership card."*

And our Higher Accountancy member in Philadelphia who, employed as a temporary man by one of the nation's outstanding firms of accountants, did so well that a month later his job was made permanent. In telling us of it, he adds, *"This I consider quite a boost for LaSalle training, since the firm was letting other men go."*

Another man cashed in on his training even more quickly, for, broke and unable to get a job, he enrolled for our Traffic Management course and then went to the employment department of the largest firm in his Southern city, told them he was enrolled with us and wanted work in their shipping department. He was given the job over a long line of applicants—largely, as they told him, because he was studying with LaSalle.

His LaSalle button won the job and at a higher salary than he expected!

A LaSalle lapel button turned the trick for another Accountancy member. It showed the employer that he had successfully completed six months training with us. That carries weight and our student got the job—over 100 other applicants—at a salary higher than he had expected!

One company—a national leader in its line—after watching five of its major executives come up from lesser jobs and twenty-eight of its rank and file increase their efficiency with the aid of LaSalle training, has worked out with LaSalle a cooperative plan under which fifty-three of its most promising employes in shop and office and salesforce are training for executive positions—and their opinion after this thorough testing is best evidenced by the words of the president, *"As I see it, LaSalle training makes a man worth more not only to himself but to the firm he works for."*

"If we've got a man that ambitious—"

There's no magic, nothing mysterious about this advantage enjoyed by our members. It's just plain common sense.

Alert employers know that it takes ambition and perseverance to study in the hours which others give to rest or pleasure—and they prefer men with those same qualities, especially when those men also have the added efficiency of the trained man.

One executive expressed this attitude forcefully when we told him that a minor employe in his warehouse was studying with us. *"If we've got a man who is that ambitious down there, we'll bring him up here and give him a real job."*

And another nationally known manager sums up the almost universal feeling of employers, *"When we find a man with sufficient faith in himself to spend his own time, energy and money to complete a home study course, we consider him as being in that group from whom our future leaders will be drawn."*

You can have this same job insurance

The remarkable thing about this LaSalle job insurance is that it is available to every normal, ambitious adult —and in nearly every major business field—at low cost and on easy terms. If you are really in earnest about protecting yourself in the present and making ready for even larger success when prosperity returns, this outstanding twentieth century development in building business success is at your service. And your first step is simple—

Send the coupon for full and free information.

The booklets which that coupon will bring may be priceless to you—if you read and act on the facts contained in them.

Fill out and mail the coupon now. "Later" means never.

*Names and Addresses gladly given on request.

LaSalle Extension University

THE WORLD'S LARGEST BUSINESS TRAINING INSTITUTION

---------- *Find Yourself Through LaSalle!* ----------

LA SALLE EXTENSION UNIVERSITY Dept. 9493-R, CHICAGO Michigan Ave. at Forty-first

Please tell me about LaSalle job insurance in the field I have checked below:

☐ Business Management	☐ Modern Salesmanship	☐ Railway Accounting
☐ Higher Accountancy	☐ Paper Salesman's Training	☐ Credit and Collection Correspondence
☐ Expert Bookkeeping	☐ Law: LL.B. Degree	☐ Business English
☐ C. P. A. Coaching	☐ Commercial Law	☐ Effective Speaking
☐ Modern Business Corres.	☐ Industrial Management	☐ Commercial Spanish
☐ Traffic Management	☐ Modern Foremanship	☐ Telegraphy—Railway and Commercial
☐ Railway Station Management	☐ Personnel Management	
	☐ Banking and Finance	

Name ---------- Present Position ---------- Address ----------

PATENTS TRADE-MARKS AND COPYRIGHTS

VICTOR BUILDING
Nearly Opposite U. S. Patent Office

OUR OFFER: FOR PROTECTION OF YOUR INVENTION

YOUR FIRST STEP: The inventor should write for our blank form —"RECORD OF INVENTION." A sketch and description should be made on this Blank, signed, witnessed, then returned to us. **We also give our opinion as to whether the invention comes within the Patent Office definition of a patentable invention. This "Record of Invention" will serve as "proof of conception." There is no charge or obligation for this service.**

Write for Our FIVE Books Mailed Free to Inventors
Our Illustrated Guide Book

HOW TO OBTAIN A PATENT

Contains full instructions regarding U. S. Patents. Our Methods, Terms, and 100 Mechanical Movements illustrated and described.

OUR TRADE-MARK BOOK

Shows value and necessity of Trade-Mark Protection. Information regarding **Trade-Marks and unfair competition in trade.**

OUR FOREIGN BOOK

We have Direct Agencies in Foreign Countries and secure Foreign Patents in shortest time and at lowest cost. **Progress of Invention** contains description of World's Most Pressing Problems by Leading Scientists and Inventors. **All Communications and Data Strictly Secret and Confidential.** Interference and Infringement Suits Prosecuted.

DELAYS ARE DANGEROUS IN PATENT MATTERS
IMPORTANT! To Avoid Delay!

YOU SHOULD HAVE YOUR CASE MADE SPECIAL IN OUR OFFICE to save correspondence, secure protection and early filing date in the Patent Office. To secure **special preparation** of your case send $25.00 on account with model or sketch and description of invention. If the invention is not patentable we will return fee less cost of search.

Our Lawyers Practice in all U. S. Courts and Defend Clients in Suits involving Patents, Trade-Marks and Copyrights

OUR ORGANIZATION OFFERS PERSONAL SERVICE

By Experienced Patent Lawyers, Solicitors and Draftsmen

We regard a Satisfied Client as our best advertisement, and furnish upon request, lists of clients in any state for whom we have secured patents. We also assist our clients to sell their inventions.

PAYMENT OF FEES IN INSTALLMENTS

It is not necessary that the total cost of a patent be paid in one payment. We permit our clients to pay for their applications in three installments as the preparation of the application progresses in our office.

Highest References — Prompt Service — Reasonable Terms

WRITE TODAY

VICTOR J. EVANS & CO.

Registered Patent Attorneys **Established 1898**
MAIN OFFICES: 672 NINTH ST., WASHINGTON, D. C.

BRANCH OFFICES: 1007 Woolworth Bldg., New York City; 828 Fidelity Phila. Trust Bldg., Philadelphia, Pa.; 514 Empire Bldg., Pittsburgh, Pa.; 1640-42 Conway Bldg., Chicago, Ill.; 1010 Hobert Bldg., San Francisco, Calif.

Gentlemen: Please send me FREE OF CHARGE your books as described above.

FREE COUPON

Name .....

Address .....

Thank You for Mentioning Modern Mechanics and Inventions for September When Writing to Advertisers

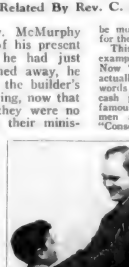
Minister's Son Burns Mortgage On Home

And Starts "Fortune" For Father

Former Poor Country Preacher Now Reveals Small Son's Secret That Saved Family Home and Brought Prosperity and Happiness. Tells Easy Way for Any Man or Woman to End Money Worries. A Remarkable Story of Dramatic Facts More Thrilling Than Fiction Because It Is Actually True. A Life Drama With a New Kind of Happy Ending That Will Probably Amaze You Because It Shows How You, Too, May Find the End of the Rainbow and Get Paid Actual Cash for Just Saying 20 Magic Words to Ladies. No Need to Sell Anything.

As Related By Rev. C. McMurphy

WITH a sigh of despair Rev. McMurphy thought of the hopelessness of his present situation. Would the home he had just built for his little family be snatched away, he thought? How could he ever meet the builder's notes? How could he even earn a living, now that their little car had given out and they were no longer able to travel and carry on their ministerial work. The outlook was surely despairing.



Then the darkness vanished. And it was his little boy who lifted the shadow. "Daddy," he exclaimed, "I have a surprise. I have a way out of our troubles." Excitedly he told his astonished father of an article he had read about the president of a million dollar institution in Ohio who had founded a plan to help worthy men and women out of their money troubles. Breathlessly he told that he had written this man and showed his father the reply.

Eagerly Rev. McMurphy read every word of the great deeds this remarkable man is doing for other men and women. He read of the vast business of this big institution, scattered all over America—business so wide-spread that it is possible to help local men and women to end their money troubles for just looking after this business in full or spare time. "What a generous offer for anyone to make. And how easy and simple, too. The end of my financial worries," exclaimed Rev. McMurphy.

The possibilities seemed too good to be true. But he became convinced as he read letter after letter from other men and women, some saying that they made as high as $35 and $40 in a single day. And it must be true—this man surely must be sincere. For he won't even let anyone risk one penny buying anything. He just wants you to follow his simple plan.

"Why, daddy," said the boy, "even I can do this easy work. Let me try—please. Just loan me a few dollars to pay my expenses, daddy." Encouraged by the enthusiasm of this 9-year-old child, he accepted this man's generous offer of help. But he also determined to allow this child to complete his wonderful lesson in courage and faith, so he let the boy go alone on the first trip. The result was so amazing that his father wrote as follows:

"My little boy came back in about an hour with profits of nearly $3.00. I thought: 'If this child can make that much, I can make twice that amount.' And I took up the work. I assure you I now have no fear of financial problems. The notes on the house have been burned and we have a nice car to ride around in. Last Saturday I went out after 2 o'clock, made $30.00 and returned before sunset. If all the underpaid country preachers could learn what a great opportunity awaits them with you there would be more good cheer in preaching the gospel. I thank God for the day my little boy wrote you."

This thrilling true story of Rev. McMurphy is but an example of the many letters Mr. Van De Mark has received. Now "Van" has openings for more women and men and actually offers to pay them cash for just saying 20 magic words to 10 ladies. No need to sell anything to get this cash pay. This is the revolutionary new plan of this famous business genius who has already helped over 30,000 men and women toward ending their money troubles. "Conservative" business leaders called "Van" crazy for making this radical cash pay agreement. They said it would ruin "conservative" traditions. Cooler heads called it a master stroke and applauded "Van" for his great generosity. Now "Van" himself reveals the sensational truth. "Countless house-wives have learned that they can make great savings on our amazing bargain offers. So in almost no time the sale of our products has expanded almost to the bursting point. Now we must hurry and engage 1100 more local men and women to take care of regular customers. Big money for our workers means nothing to us now. I will not only pay you an actual cash penalty if your first 10 calls do not get you big money, but I allow you to make a handsome profit on every order my customers give you. To show you that I do things in a big way I will even send you $13.00 worth (retail value) of my products to start you. Don't send a cent for this amazing offer—just mail application below. If up to $15.00 a day will end your money worries, then rush the application. This generous offer will bring thousands of applications. If you delay it may be too late. This whole plan is so generous that people ask me how in the world I can afford to do it. But I believe in live and let live. We can't take our money with us when we go, so let there be happiness and prosperity spread all over this earth. Just be honest and fair with me, and I will help toward ending your money worries. Tell me how much you want—$15 in a day for full time? $3 in an hour for spare time? I will gladly send you my written cash pay agreement, legal and binding upon me." Curtis W. Van De Mark, Dept. 2034-JJ, Ninth and Sycamore Sts., Cincinnati, Ohio.

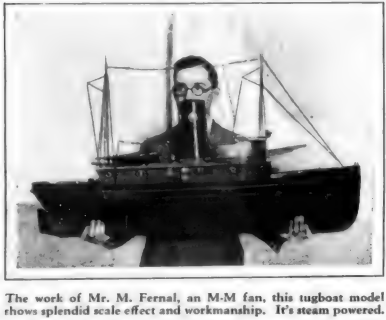
Curtis W. Van De Mark,
Dept. 2034-JJ, Ninth and Sycamore Sts.,
Cincinnati, Ohio.

I hereby apply for the opening in my town to start on your new cash pay plan. Send your generous offer of $13.00 (retail value) of your goods to start me. I risk nothing. This is not an order—send nothing C.O.D. I want $.....an hour.

Name .....

Address .....

City ..... State.....

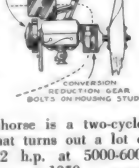


The work of Mr. M. Fernal, an M-M fan, this tugboat model shows splendid scale effect and workmanship. It's steam powered.

CHET NEDWIDEK, naval architect who designed Modish Mekaniks' canvas covered canoe, has stepped up. Chet did the drafting on the *Weetamoe*, Lipton Cup challenger, working under Clinton Crane, the old master. Incidentally *Weetamoe* looks like the contender, in finality.

* * *

JUST got the dope on the manner in which the Johnson Seahorse was converted, and I'm passing along a general outline of the thing as I understand it. To the end of the motor base where the shaft usually hooks on, a case was made to hold an internal gear. This case holds the thrust bearing, and also the water pump which must be used, as the Seahorse is a two-cycler and is of a breed that turns out a lot of heat. Developing 32 h.p. at 5000-6000 r.p.m. it turns the prop at 1350 revs, and flies strongly.



* * *

HI SIBLEY'S article on the model airplane that takes off under its own rubber steam and then drops a parachute is sure enough a natural. I'd vociferate and say "Says me!" if Sherm Clinger, of Kansas City, hadn't taken the pains to have a record made of his voice—the record, which I listened to personally, saying that it griped him not a little when I started to crow. In this paragraph only I'm a pansy, and for this one time, Clinger, old kid, I'll desist. You heard me.

* * *

LATELY there has been so much mail to this old Greaae Monkey I've taken to answering the notes via the type mill, in person. Here's one that Gene just brought in from the old galvanized mail tub out at the Hangar gate. It says:

Dear Andy:

This is my first line to you but I feel that you are a very personal friend of mine as I have never missed a word you have had to say. I think M. Mech is one of the greatest mags in the country and surely the best of its kind. I have every issue since its birth. It has filled a need and the call of youth and surely a desire I have had for about 8 years, in service and dope on lightplanes.

The S. M. Box has always been interesting but since you have been slinging your greasy paw across same and expounding your dry wit, mixed with so much fact and theory it has become a different proposition. In other words it is a wow and I think all the boys like it better. It is always the first thing I read, after I glance over the plane plans for the month.

I was tickled pink with the news of the Pietenpol Camper with the Ford A motor. It is just the ship I have been waiting for. Perhaps you are in a position to give me some advance information on this little plane. I will have lots of time to work this summer that I will not have during the fall and winter months. If I was sure of the wing curve and chord I could get a good start and save lots of time. Anything you can give me will be appreciated . . .

Old top, don't work too hard and if you begin to get too warm stand in someone's prop blast until you feel like starting again.

Thanking you again, wishing you worlds of success and trusting I'll get a few lines from you soon, I am your friend, a lightplane booster, and good old M. Mech's cheer leader. Gratefully,

Oscar B. Williams

(Continued on page 26)

AUTOS

LEARN..

BY THE MOST PRACTICAL, SUCCESSFUL METHOD···

IN LOS ANGELES!

WE TRAIN YOU RIGHT!

Be properly prepared for success in the great Automotive industry. Thousands of factories, garages, repair shops and service stations NOW demand experts... the kind of men who graduate from this famous, practical Trade School.

25 YEAR OLD INSTITUTION

Learn Autos in this Million dollar School. Previous training or education unnecessary. Start any time...no age limit. The National practical system of training insures success.

YOU DO ACTUAL SHOP-WORK HERE

At National you learn EVERY branch of the Automotive trade by actually working on thousands of dollars worth of late model cars...four, six and eight cylinder types as well as truck, tractors and aviation motors...under the personal supervision of competent instructors.

PROVEN SHOP METHODS

ALL PRACTICAL WORK!

NO DRY LESSONS

22,000 GRADUATES

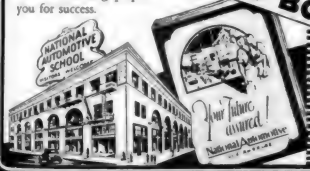
There is a steady demand for graduates of this "School of Shops"... because, National men make good! National training prepares you for success.

NOT a correspondence course...you learn here by doing the very things you will do when employed in this well paying profession. Interesting, likable training.

SEND FOR FREE BOOK

FREE EMPLOYMENT SERVICE

To graduates and part time work to pay student's living expenses Big Auto Book of information sent FREE to men who act quickly! Fill in and mail this coupon—RIGHT NOW!



NATIONAL AUTOMOTIVE SCHOOL

4006 So. Figueroa St. . Dept. 303 A O . Los Angeles, California

Please send your big FREE Book of Automobile opportunities and explain how I can quickly qualify for a big paying automobile position.

Name.....

Address.....

Age..... City..... State.....

FREE PROOF

you can make real money in

RADIO

A GLORIOUS future awaits you in this huge industry. Millions of sets need servicing, thousands of ships require radio operators . . . manufacturers and broadcasting stations throughout the land are eagerly seeking trained men . . . and now, nation-wide radio telegraph service, telephony, sound motion pictures, open up thousands of new and amazing opportunities.

LEARN AT HOME

By means of this marvelous, simplified home-training course, sponsored by the Radio Corporation of America . . . you can now prepare for success in every phase of Radio. The remarkable outlay of apparatus given to you with this course enables you to learn by actual practice how to solve every problem in radio work. That's why you, too, upon graduation can have the confidence and ability to command good money.

BACKED BY RCA

Graduates of this school are always posted in newest developments in Radio. That's why they are always in big demand. The progress of Radio is measured by the accomplishments of the Radio Corporation of America. This gigantic organization sponsors every lesson in the course.

MONEY BACK IF NOT SATISFIED

As a student you will receive an agreement signed by the president of this school assuring you of complete satisfaction upon completion of your training—or your money instantly refunded.

FREE!

This fascinating book on Radio's glorious opportunities . . . written by one of America's well-known radio experts.

RCA INSTITUTES, INC.

A Division of Radio Corporation of America

RCA INSTITUTES, Inc.
Dept. MM-9, 75 Varick Street, New York

Gentlemen: Please send me your FREE 40-page book which illustrates the opportunities in Radio and describes your home laboratory method of instruction.

Name .....

Address .....

.....

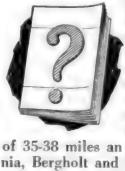
Occupation .....

Radio Operator $80—$200 per month with all expenses paid. Broadcast Operator $1,800—$4,800 a year. Radio Repair Mechanic $1,800—$4,000 a year. Radio Inspector $2,000—$4,500 a year.

Shop Mail Box Gossip

(Continued from page 24)

FOR that letter I thank you, Willie. Darned nice of you. By the time you see this you will no doubt have had a personal reply, too. The Ford Model A plane is easily the class of the field in light two seaters. You see, the heart of a light plane is its motor, and the Ford Model A motor simply can't be broken, no matter how hard you pound it. Hundreds of hours of milling at around 1500 revs doesn't take much out of the motor. That is equivalent to a car speed of 35-38 miles an hour. Peters of California, Bergholt and others have built Ford A ships. Largely they seem to be patterned after the first Pietenpol, built 2 years ago. The Bergholt control system is the same, anyway. I am told the latest Pietenpol is bugless, and the fifth of the breed.

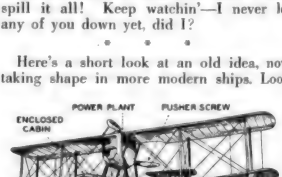


* * *

Man, oh, man! See that cut with the question mark on the cover? That represents the new Flying Manual, which will be available in October sometime if you watch your local newsstand and buy your copy before the stand is sold out. You'll know the book by its blue cover and new design with the 1931 label on it. I just got word the other day from the boys up front as to what she'll be like, and—well, I can't spill it all! Keep watchin'—I never let any of you down yet, did I?

* * *

Here's a short look at an old idea, now taking shape in more modern ships. Look



VICKERS VIKING AMPHIBIAN

at the old Vickers Amphib here, many of which are going strong still in the wild wet wilds of Canady.

(Continued on page 28)

Learn Your Trade from these practical books

AVIATION

☐ **Modern Aircraft** by Major Victor W. Pagé. Covers all types of American and foreign airplanes and engines: design and construction, with complete instructions for operation and maintenance. Nineteen practical chapters. Used in 200 schools. 855 pages, 400 illustrations, 23 tables. **Price $5.00**

☐ **Modern Aviation Engines** by Major Victor W. Pagé. A gold mine of necessary, up-to-date information. Describes, explains, illustrates every type of aircraft motor—installation, repairs, maintenance. Two great volumes, with 1000 pages, 500 illustrations in each book. **Price per vol. $5.00; both volumes $9.00.**

☐ **Aviation Engine Examiner** by Major Victor W. Pagé. Gives all the points of a complete course of lessons in book form. Aviation engines explained in simple questions and answers. Prepares you for job as aircraft engine mechanic; also valuable to pilots and students. Describes all types aviation engines, parts and construction principles of operation, with instructions for engine inspection, installation, trouble-locating and repair. 600 pages, 250 illustrations. **Price $3.00**

☐ **Everybody's Aviation Guide** by Major Victor W. Pagé. Questions and Answers; all the "such aviation from the beginning. Complete information necessary for U. S. Government license. Construction of airplane—such suggestions — equilibrium — controls — compasses, 100 illustrations. **Price $2.00.**

☐ **Aerial Navigation and Meteorology** by Captain Lewis A. Yancey. Tells how to fly your course with precision and assurance. 200 pages, special illustrations, 102 photographs and colored plates. Solved problems and examples for practice. **Price $4.00.**

☐ **Henley's A. B. C. of Gliding and Soaring.** Edited by Major Victor W. Pagé. A brand new book on modern flying, based on practical, German experience and personal experience of author, a pioneer with gliders. Explains everything about this popular sport; all types of Gliders and Sailplanes, their construction, control and handling; tow devices; gliding, air currents, etc. Instructions for building the simple Glider, with WORKING DRAWINGS. How to form a Glider Club, etc. Get this book and enjoy one of the most thrilling and inexpensive sports. 200 pages, 150 illustrations. **Price, Paper Binding $1.50; Cloth $2.00.**

☐ **A. B. C. of Aviation** by Major Victor W. Pagé. A clearly written book giving you a basic knowledge of aircraft and why they fly. Discusses aviation possibilities, standardized flying, etc. An ideal book for everyone approaching study of aviation. 160 pages, 150 illustrations. **Price $1.00.**

Any Titles Sent to You for 5 DAYS EXAMINATION

Thousands of dollars worth of UP-TO-DATE PRACTICAL information written by outstanding authorities, profusely illustrated with plates, diagrams, charts, etc. Simple, non-technical. Let these practical books help you make more money. Which shall we send you? Take advantage of liberal 5-day Examination Offer—Mail order now.

AUTOS

☐ **Modern Gasoline Automobile** by Pagé. Everything you want to know about automobiles in this NEW EDITION OF a famous work. Complete, up-to-date, authoritative, clearly and simply written. Care of your car, trouble prevention, trouble detection, repairs. An encyclopedia in one volume. 1166 pages, 1000 illustrations. **Price $5.00.** (With special 25x38-inch Trouble Shooting Chart **$5.25.**)

☐ **Ford, Model "A" Car** by Major Victor W. Pagé. The book you have been waiting for! Explains the new Ford inside and out, construction, operation and repair. Every part described and illustrated. All repair operations illustrated and explained by more than 100 specially posed photographs. 345 pages. 292 Diagrams and Photographs. **Price $2.00** (With special 25x38-inch Ford "A" Trouble Shooting Chart **$2.25.**)

☐ **Ford, Model "T" Car** by Major Victor W. Pagé. Including Fordson Farm Tractor. Most complete book in existence on construction, operation and repair. Includes the F. A. Starting and Lighting System. All parts of the Ford Model T Car and Fordson Tractor described and illustrated. Complete instructions for driving and all repair processes. 655 pages, 150 special drawings and Plates **Price $2.00.** (With special 25x38-inch Trouble Shooting Chart showing detailed construction and repair **$2.25.**)

☐ **Automobile Welding with the Oxy-Acetylene Flame** by M. Keith Dunham. Clearly explains everything about oxy-acetylene welding. Garage, Service Stations, Auto owners. Explains machine shop save money and time with this book. Equipment, processes, methods. 167 pages, fully illustrated. **Price $1.50.**

ELECTRICITY

☐ **Electricity for Beginners** by E. H. Hall. Thousands. Just the book for those who want to begin at the bottom of their study of Electricity. Written by an experienced instructor, and containing 186 pages, fully illustrated with easily followed line drawings and diagrams. Explains many of the common terms and everyday manifestations of electricity that form an excellent groundwork, and a basis for a more thorough study of the subject. Used in many high schools. **Price $1.50.**

☐ **House Wiring** by Thomas W. Poppe, E. E. 5th revised edition, fully describes up-to-date wiring methods. 35 thorough chapters on planning, installing, testing wiring in new and old buildings, partitions, conduits. A standard work for the electrician and contractor. Meets all rulings of underwriters. 208 pages, 160 illustrations. **Price $1.00.**

☐ **Everybody's Electrical Handbook** by Edward J. Volk, P. E. With this book you can do almost any of the small electrical jobs about your home. Plainly written. How to start, how to go—every step fully explained. How to locate trouble and make repairs. Saves you money and time. Pocket size. 320 pages, 78 illustrations. **Price $1.00.**

☐ **Arithmetic of Electricity** by Prof. T. O'Conor Sloane. Reduces all electrical calculations to a series of simple rules, using only common arithmetic. Every rule illustrated by practical problems and detailed solutions. No need to know any higher mathematics to understand electrical mathematics. Everyone interested in electricity needs this very practical book. Revised and enlarged **23rd edition. Just out. 230 pages. Price $1.50.**

☐ **Storage Batteries Simplified** by V. W. Page, M.S.A.E. Non-technically explains modern storage batteries and their wide usefulness in autos, motorcycles, submarines, electrics, etc. Explains repair processes, charging, rebuilding, etc. Most thorough work ever published on this subject. Auto repairmen, owners, service men, need this book. 258 pages, 112 illustrations. **Price $2.00.**

SEND NO MONEY—Just Check Books Wanted

Use this page as your Order Form. Tear out and mail. The books you want will come to you ON APPROVAL. Pay postman on delivery. **Your money back if not satisfied—simply return books in 5 days. You take no risk, so send NOW for these helpful pay-raising books.**

WRITE NAME AND ADDRESS BELOW

Norman W. Henley Publishing Co., Dept. 930
2 West 45th Street, New York, N. Y.

Please send me the book or books, checked on this page. I enclose no money but will deposit the price, plus postage, with the postman on delivery. My money back if I return books within 5 days after receipt

Use this Page as Your Order Blank.
Tear Out and Mail to Us.

Name .....

Address .....

Town ..... State.....
(Outside of U. S. cash with order)

( ) Check here for FREE Catalog.

FREE CATALOG

If you don't find the book you want on this page, send for FREE Catalog of famous Henley books. On more than 50 different subjects. Standard, accurate, NEW, works on Radio, Machine Shop Practice, Heating, Plumbing, Boats, Chemistry, Railroading, etc.

NORMAN W. HENLEY PUBLISHING CO.
Dept. 930, 2 West 45th St., New York, N. Y.

He gets $100 a week now

A LITTLE over a year ago he was just a hand—an untrained worker doing ordinary work and getting an ordinary salary. Then he decided to take up a course with the International Correspondence Schools. He studied at home in the evening and in spare moments during the day.

In three months he became assistant foreman—then foreman—and then one day they called him into the head office to supervise all blue-print work. He's earning $100 a week now, and to quote the head of the firm—"That's only a start. He has the brightest future of any man in the organization." Start today to go up!

How much longer are you going to wait before taking the step that is bound to bring you advancement and more money?

Mail Coupon for Free Booklet

INTERNATIONAL CORRESPONDENCE SCHOOLS
"The Universal University"
Box 2317-G, Scranton, Penna.

Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject *before* which I have marked X:

TECHNICAL AND INDUSTRIAL COURSES

☐ Architect	☐ Automobile Mechanic
☐ Architectural Draftsman	☐ Plumbing ☐ Steam Fitting
☐ Building Estimating	☐ Heating ☐ Ventilation
☐ Wood Millworking	☐ Sheet Metal Worker
☐ Contractor and Builder	☐ Steam Engineer
☐ Structural Draftsman	☐ Steam Electric Engineer
☐ Structural Engineer	☐ Civil Engineer
☐ Electric Wiring	☐ Surveying and Mapping
☐ Electrical Engineer	☐ Refrigeration ☐ Highway Engineer
☐ Electric Lighting	☐ R. R. Locomotives
☐ Welding, Electric and Gas	☐ R. R. Section Foreman
☐ Reading Shop Blueprints	☐ R. R. Bridge and Building Foreman
☐ Telegraph Engineer	☐ Air Brakes ☐ Train Operation
☐ Telephone Work	☐ Highway Engineering
☐ Mechanical Engineer	☐ Chemistry ☐ Pharmacy
☐ Mechanical Draftsman	☐ Coal Mining Engineer
☐ Machinist ☐ Toolmaker	☐ Navigation ☐ Boilermaker
☐ Patternmaker	☐ Textile Overseer or Supt.
☐ Pipefitter ☐ Tinsmith	☐ Cotton Manufacturing
☐ Bridge Engineer	☐ Woolen Manufacturing
☐ Bridge and Building Foreman	☐ Agriculture ☐ Fruit Growing
☐ Gas Engines ☐ Diesel Engines	☐ Poultry Farming ☐ Radio
☐ Aviation Engines	☐ Marine Engineer

BUSINESS TRAINING COURSES

☐ Business Management	☐ Business Correspondence
☐ Office Management	☐ Lettering Show Cards ☐ Signs
☐ Industrial Management	☐ Stenography and Typing
☐ Personnel Management	☐ Complete Commercial
☐ Traffic Management	☐ Civil Service ☐ Mail Carrier
☐ Accountancy ☐ Cost Accountant	☐ Railway Mail Clerk
☐ C. P. Accountant	☐ Grade School Subjects
☐ Bookkeeping	☐ High School Subjects
☐ Secretarial Work	☐ College Preparatory
☐ Spanish ☐ French	☐ Illustrating ☐ Cartooning
☐ Salesmanship ☐ Advertising	☐ Lumber Dealer

Name .....

Address .....

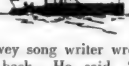
City ..... State .....

Occupation .....

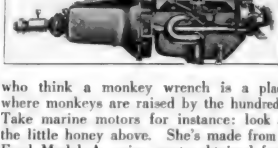
If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

Andy's Mail Box

(Continued from page 26)



SOME screwey song writer wrote a ditty a while back. He said, "The Best Things in Life are Free." He's nuts. At least for mechanics and grease monks and other experimenters, they aren't so free. Still, you can get a good boat, or a good radio, or a good car or real airplane for a lot less than can the poor unfortunates



who think a monkey wrench is a place where monkeys are raised by the hundreds. Take marine motors for instance: look at the little honey above. She's made from a Ford Model A, using parts obtained from the Barker Factory, Norwalk, Conn. Yeh, we've got the edge on the clan, gents, we who can use our hands to build things others have to buy.

* * *

In a magazine office, things happen at a heck of a high rate of speed. Someday I'm going to give you a five minute sketch of one of my typical days. They include getting letters like this, which is welcome even if it has got teeth:

La Grande, Ore.

Dear Andy:

Since your magazine first appeared I have not missed a copy. And may I now express my opinion. It seems as though Modern Mechanics has gone mostly to aviation, may I suggest you change the name to Modern Aviation—it would sound more appropriate. With the increasing popularity of outboard motors and cruisers it seems as though they should have a little space once in a while, so far there has appeared one good article in Modern Mechanics on boats; this was on how to build a hydroplane and I dare say this article alone stirred up interest in many places where that was otherwise getting pretty dull and indifferent.

Now we all know that airplanes are the coming things, and the modern way of

(Continued on page 32)

Thank You for Mentioning Modern Mechanics and Inventions for September When Writing to Advertisers

Young Man! Here Is Your Opportunity to Make BIG MONEY

START in business for yourself now! You can do it with the Foley Automatic Saw Filer. Nothing else like it in the world. Files hand, band and circular saws **automatically** with such mechanical accuracy that they cut faster and stay sharp longer. Better than the most expert hand filing. **Easy work** to file 5 and 6 **hand saws** an hour. **No experience necessary**—even boys of 14 are operating the Foley Filer. Simply adjust the saw in the machine and snap on the switch. You don't have to be a skilled mechanic to do it—very simple to operate. With a little practice you can turn out **perfect cutting saws** that will please your customers and bring you plenty of repeat business.

Start At Home In Spare Time

Make $2 to $3 an hour in spare time while starting. No high-rent store necessary, very little capital needed. You can start in your garage, basement, attic, or anywhere. Soon you will have plenty of business to keep you busy full time. J. J. Southwick writes, **"Enclosed find contract for my second Foley Filer. The first machine easily paid its own way and increased business, and I am expecting this to do the same."** Frank Huber says, **"It is very easy to pick up enough work to pay for the machine in a short time."**

FREE PLAN HELPS YOU

Lots of men, old and young, are making **big money** filing saws on the Foley. They have a fine paying, steady year-'round cash business of their own. Many started in their spare time. Our **Free Plan** shows you how to get started. Others are making **big profits** from the Foley Filer — get in the game! Be your own boss—don't delay — mail coupon NOW!

$52 in One Week

"I started filing saws on the Foley as a sort of hobby in my spare time. I got my first machine and in five months had to buy another. Have filed $52 worth in one week, and am absolutely satisfied. Instead of a plaything hobby, it has gotten to be a regular business."

E. V. Harper.

* * *

"Made a new record Monday, filing fifty saws in less than 9 hours."

M. S. Gray.

No Canvassing

You can get all the business you can handle from carpenters, contractors, schools, factories, hardware stores, and others. William G. Diederick writes, **"I am kept busy filing saws. To tell the truth, I get more saws than I can handle."** Thomas Hoadley has filed between 25,000 and 30,000 saws during the last two years with his two machines.

Foley Manufacturing Company
275 Foley Bldg., 11 Main St. N. E.
MINNEAPOLIS, MINNESOTA

Mail Coupon for FREE PLAN

FOLEY
Manufacturing Co.
275 Foley Bldg.,
11 Main St. N. E.
Minneapolis, Minnesota.

Please send me **Free Plan** telling me how I can start my own business in spare time and make **big money** with the Foley

Name .....

Address .....

City ..... State .....

Classified Advertisements

MONEY-MAKING OPPORTUNITIES IN TABLOID FORM

Rates for classified ads, 15 cents per word per insertion, or 12 cents per word per insertion for six insertions. Minimum 10 words. Cash should accompany order. Closing date 20th of third month preceding date of issue. Address Classified Manager, Modern Mechanics Magazine, 35 East Wacker Drive, Chicago, Ill.

AIRPLANE BUILDERS

AIRCRAFT DRAFTSMEN are in demand. Learn at home in your spare time, from trained engineers. Complete drafting outfit furnished free. Pay as you learn. Employment service. Write Ray Reynolds, Directing Engineer, California Technical College, Dept. 12, San Diego, California, for free book "Be a Drafting Expert."

VARIOUS sizes Balsa, reeds, round wood, bamboo, propeller blank. A big bundle for 30c. Four for $1.00. Aero Shop, 3030 Hurlbut Ave., Detroit, Mich.

$175 will build our beautiful, Henderson powered, high speed, steel fuselage, rear place monoplane, plans $1.00. Literature 10c. Barney Snyder, Rochester, Ind.

AVIATION

IMPROVED Ford Motored Flying Fliviver is the easiest plane to learn flying in, because it lands at only 18 miles per hour. Price, Flyaway, $985.00, or simple and inexpensive to build yourself. Send dime, coin, for illustrated literature. Federal Equipment Co., Hartland, Wis.

SAILPLANES, wonderful performance. $4.25. Full scale plans, $2.50. Gliders, good trainers, light weight, $2.75. Plans, $1.50. Wing ready to cover, $100. Wing ribs, $2.9 with spars, $35. Tapered sailplane wing, $125, uncovered. Ribs, $45. Spruce rib stock 2c ft. Descriptive literature, 10c. Aerogliders, Rochester, Ind.

DESIGNERS booklet, gives sizes in %, of, wing, fuselage, rudder, fin, stabilizer, tail length & moment, fuselage, how to balance ship, relation of wing and horse power loading. What you must know to build a successful plane. Price 50c. Barney Snyder, Rochester, Indiana.

LATEST, best and up-to-date aviation books. Modern Aircraft, 500 photos, 500 engravings. Price $5.00. Everybody's Aviation Guide, 256 pages, 140 illustrations. Price $2.00. WRC Motors, 160 pages, 150 illustrations. Price $1.00. Modern Aviation Engines, 2,000 pages, more than 1,000 engravings in two large volumes. Price $9.00 for the set. All these books are written by Major Victor W. Page. Also the latest book on the subject of "Aeronautics, Aviation and Meteorology," by Capt. Lewis A. Yancey, who made the famous flight from Old Orchard, Maine, to Rome, Italy; 350 pages, 102 illustrations. Price $4.00. You make no mistake in ordering any of these books as they are all standard works, and some are used in 200 schools for instruction purposes. Any of these books sent prepaid on receipt of price, or just send us a card ordering book desired, and you can pay postman the price of book and postal charges when book is delivered. We publish books on more than 150 different subjects, and will send catalog on request. Norman W. Henley Publishing Company, 2 West 45th St., New York. Dept. 39.

BUILD or buy a "flying Fliver". The simplest and safest light plane for the beginner. Price complete $985, guaranteed to fly with 180 lb. pilot. Blueprints $3. Ford and Chevrolet motors ready to fly $150. Motor blueprints $4. Bargains in parts and supplies. Circulars 10c. Storms Aviation Co., Spartanburg, S. C.

LIGHT Plane motors; supplies; materials; Used Planes; Everything Aeronautical. Send dime for illustrated literature. Marsh & Cendt Aircraft Co., Colby, Wisconsin.

AGENTS WANTED

JOIN Agents' Syndicate. At your service. Free information bureau on advertised selling specialtions. Sales helps. Best opportunities investigated. Cooperative correspondence. New inventions. Many free features. Write Agents' Cooperative Syndicate, 509 Fifth Avenue, New York.

BIG PROFIT putting our gold sign letters on store windows, without experience. Samples furnished. 669-BA, West Van Buren, Chicago.

WE START you without a dollar. Soaps, Extracts, Perfumes, Toilet Goods. Experience unnecessary. Carnation Co., 435, St. Louis, Missouri.

AGENTS buy direct at lowest mill price. Men's Latest Fancy Hose, doz. $1.45-$1.85. Samples. Pontex Silk Hose, doz. $4.25-$7.00. Catalog FREE. Superior Knitting Company, Dept. 52, New Haven, Conn.

NEW... Rubber Soles. Cement on instantly. Never loosen. Outwears leather. Waterproof. Sells fast. Big Repeater. Test at my expense. Bestever Co., 215 Irving Park, Chicago.

BIG MONEY Daily Selling Shirts, Ties, Underwear, Sox, Raincoats, Lumberjacks, Sweaters, Leather Coats, Mackinaws, Coveralls, Pants, Children's Playsuits. Outfit FREE! Experience unnecessary. Nimrod Co., Dept. 132, 4922-28 Lincoln Ave., Chicago.

YOU can make big money in the Food Business. No capital or experience needed, credit given. Write to your choice to establish a permanent business of your own in exclusive territory. We furnish Free Sample Case and Free Samples for customers. Repeat orders every week. Ask now! Federal Pure Food Co., F2307 Archer, Chicago.

STRANGE Battery Compound charges instantly. Eliminates old method. Gives new life and pep. Big profits. Gallon freight prepaid. Kemiko, Paul, Minn.

GREAT success making your own products! Have others selling them. Start this fastest Big Money Business. My "Eye-Opening" literature tells how and lists Formulas, Processes, Trade-secrets of Best-Selling Specialties—all kinds—all lines. Investment small, profits immense. Start anywhere. Miller, Chemist, 1706-B Miller Chemical Building, Tampa, Florida.

$2.98 RAINCOAT line pays record-breaking profits. Flashy new numbers. Season on. Experience unnecessary. Outfit FREE. American 3908DS, Lincoln Ave., Chicago.

AGENTS—Wonderful opportunity to make $10 a day with our big new line of soaps. Highest quality. Beautiful packages. Large orders in every home. Steady repeat business. Big profits. Particulars free. Albert Mills, 5157 Monmouth, Cincinnati, O.

FORMULAS—All kinds. Catalog free. Clover Laboratories, MM, Park Ridge, Illinois.

66 MILES on 1 gallon. Wonderful new Moisture Gas Saver. All autos. 1 sent to introduce. Critchlow, 803-EJ, Wheaton, Ill.

350,000 ARTICLES Wholesale—Directory 10c. F. Patterson, 4111 University, Des Moines, Iowa.

STRANGE Fluid charges batteries instantly. Prevents sulphation, freezing and overcharging. Doubles life and pep. Holds charge indefinitely. Discards old cells. Write for free charge, and money making opportunity. Elliott Works, Dept. 100, Des Moines, Iowa.

SELL changeable signs to stores, size 14x24, six lines, cost 35c, sells for $1.50; send for free sample offer. National Sign System, St. Louis, Mo.

SUCCEED with your own products. Make them yourself. Formulas, Processes, Trade-Secrets. Expert Analytical Service. Catalog, circulars free. A. Thaxly Co., Washington, D. C.

CALIFORNIA perfumed beads selling like hot cakes. Agents coining money. Big profits. Catalog free. Mission Factory K, 2328 W. Pico, Los Angeles, Cal.

AUTOMOBILES AND ACCESSORIES

66 MILES on 1 gallon. Wonderful new Moisture Gas Saver. All autos. 1 sent to introduce. Critchlow, 803-EJ, Wheaton, Ill.

AUTOMOBILE Specialties—Guaranteed formulas for all latest money makers. Lowest prices. Lightning Electrolyte charges storage batteries instantly, $5.00. Write for free lists. Murphy, Chemist, Box N, Tujunga, Calif.

BUSINESS OPPORTUNITIES

AMATEUR cartoonists, earn $25.00 week, spare time, copying cartoons for advertisers. Three-M Syndicate, Argyle, Texas.

SELL by Mail. Books, Novelties, Bargains! Large Profits. Particulars Free. C. Elco, 525 S. Dearborn, Chicago.

SELL by mail! Start your own small business anywhere. Free folder tells how. No personal selling. Everything furnished. D. Horton, Metropolitan Bldg., St. Paul, Minn.

CAN you Draw? Something new. Samples — Particulars 10c. Straley, 1316M Main. Springfield, Ohio.

Thank You for Mentioning Modern Mechanics and Inventions for September When Writing to Advertisers

Classified Advertisements

SUCCEED with your own products. Make them yourself. Formulas, Processes, Trade-Secrets. Expert Analytical Service. Catalog, circulars free. A. Thaxly Co., Washington, D. C.

AMAZING New Invention! Screw-Holding Screw Drivers! Remove, insert screws inaccessible places! Factories, garages, electricians, auto, radio owners buy on sight! Exclusive territory. Free trial. Tooleo, 1639 Water St., Boston.

MAKE MONEY collecting money. Become a collection manager or start a paying business of your own, spare or full time. Good income. Quick results. Interesting booklet sent free. National Collectors Association, 20 Gunnell Bldg., Newark, Ohio.

35 MILES on 1 gallon. Wonderful new Moisture Gas Saver. All autos. Sent to introduce. Critchlow, 803-E1, Wheaton, Ill.

FANCY woods for making models and toys. Send one dollar for samples, fifty cents for price list. Ross Brumbaugh, Reedsville, W. Va.

CARTOONISTS

CARTOONISTS: Sell your drawings. Proven Plan. Cattle Studios, Independence, Mo.

DETECTIVES

DETECTIVES earn big money. Excellent opportunity. Experience unnecessary. Particulars free. Write, George Wagner, 2190-V Broadway, N. Y.

DUPLICATING MACHINES

"EXCELLOGRAPH" Portable Rotary Stencil Printing Duplicators $39.00. Complete. Terms, description, testimonials, printed samples. Free. Pittsburgh Typewriter Supply Co., Dept. 540 Pittsburgh, Pa.

DISTRICT MANAGERS

WANTED District Managers. Oldest Organization of its kind in Accident and Health Insurance. Salary today for information. Dept. 21, Inter-State Business Men's Accident Ass'n, Des Moines, Iowa.

EDUCATIONAL

LEARN Practical Tool Designing. Designing Tools, Jigs, Fixtures, Dies. Prerequisite Shop Experience. Blue print reading, sketching, figuring. Tool Engineering Service Bureau, P.O. Box 503, Chicago.

FORMULAS

500 FORMULAS and Big Catalog 25c. Ideal Book Shop, DM, Park Ridge, Illinois.

ANY formula $1.00; absolutely guaranteed, or money refunded. Send for free lists. Doris Chemical Laboratories, 1311B East 84, Cleveland, Ohio.

CHEMICAL formulas, processes, analyses, research. Bert Laboratories, 693 Broadway, New York.

LIQUID Leather, Plastique Wood, Gem-rubber Soles, Transferine, Automobile Preparations, Including Instantaneous Refinisher and Instantaneous Battery Recharger, Cosmetics — Complete Line, Cleaners—All Kinds, Candies, Foods, 50c Each. Practically any formula, 50c. Just send 50c and name it. Catalog Free. Industrial Institute, Department 301, 64 West Randolph, Chicago.

FARM LAND

SELL your Real Estate Quickly for cash no matter where located. Write John Black, Box 54, Chippewa Falls, Wisconsin.

OZARKS—20 acres, timbered, poultry, fruit, berry land. Hunting, fishing. $100.00, $5.00 monthly. Hubbard, 227 Grossman Bldg., Kansas City, Kans.

TUNG oil varnish tree groves. Suburban Orchard Growers, Biloxi, Miss.

FOR INVENTORS

INVENTOR'S Universal Educator: contains 900 mechanical movements; 50 Perpetual Motions; instruction on procuring and selling patents and selecting an attorney, etc. Suggests new ideas. Price $1.00 postpaid in U.S.A. Address Dept. 602A, publishers, 602A, Ouray Building, Washington, D. C.

HELP WANTED

POSITIONS—Aboard ocean liners; See the world. Experience unnecessary; Details free. Mr. Arculus, Box 292, Mount Vernon, N. Y.

HYPNOTISM

MASTER HYPNOTISM. Eighteen part course. Information for stamp. Dr. Lonk, MM-2945 North Ridgeway, Chicago.

INFORMATION

ADVICE. Information any subject 25c and up. Fred Klotz, Reading, Pa.

INVENTIONS

INVENTORS: Now you can Protect, Sell, or Investigate the value of your inventions or ideas without spending a penny for patents or attorney fees. Save hundreds of dollars and many months delay. Inexpensive. Guaranteed. Write Inventors Protection Bureau, Dept. 22, 173 West Madison, Chicago.

MANUFACTURING

MACHINE SHOP, Dies, Stampings, Models, Brass Work. Circular free. Boone's Metal Specialists, Kansas City, Mo.

MALE HELP WANTED

GET outdoor gov't jobs; $135-$200 month; vacation. Patrol forests and parks; protect game. Details free. Write—Delmar Institute, B32, Denver, Colorado.

DETECTIVES. Work home or travel. Experience unnecessary. Write, American Detective System, 2188 Broadway, N. Y.

MOTION PICTURES

SOUVENIR strips Movietone Photophone Talkie Film; Big list film bargains and samples all for dime. Eastin Feature Films, Dept. M, Galesburg, Illinois.

MODELS

INVENTORS: Send us sketch or crude model of your idea. Crescent craftsmen will develop it into a practical working model. 30 years of successful experience and thousands of satisfied clients. Confidential service guaranteed. Bank references furnished. Free illustrated book: "Making Inventions Pay." Crescent Tool Co., Dept. T-9, Cincinnati, Ohio.

MOTORCYCLES

MOTORCYCLES, $25 to $100, easy terms. Side car, $25; engines for airplanes, motorcycles, boats and sleds, $15 to $100. Airplane wheels, $3. New Firestone tires, $5; frames, $3; forks, $3; wheels, $3; chains, $2. Belts, magnetos, generators, tanks, cylinders, pistons, handle bars, saddles, parts. New low prices. Stamp dollars. Rebuilt bicycles, $9.50. Send 50c for catalog. Price Cutter Deninger, Rochester, N. Y.

MOTORCYCLE Bargains, lowest prices, bargain sheets for stamp, special aviators supplies, motorcycle accessories largest line in America, lowest prices. Largest motorcycle mail order house in the United States. Rochester Harley Davidson Corporation, 129 West Main St., Rochester, N. Y.

MAGIC TRICKS, BOOKS AND JOKES

LARGE illustrated catalogue 1,000 tricks, 10c; 50 bills stage money, 20c; multiplying billiard balls, best, 35c; ten card tricks, 50c; fire eater, 30c. Oaks Magical Co., Dept. 100, Oshkosh, Wis.

FOOL your friends—Letters mailed from New York, 10c each. Mail Service, 509 Fifth Avenue, New York.

NOVELTIES

MEXICAN Jumping Beans. Rarest Curiosity in the World. Big seller in cigar stores, at fairs, and on street corners. 200 for $2.00. H. Ludlow, 1008 Indiana, La Porte, Ind.

OLD CORRESPONDENCE COURSES

I BUY used correspondence school courses and used business books. Describe and enclose self-addressed stamped envelope in my offer. C. W. Young, MMI, Chattanooga, Tenn.

PATENTS OR INVENTIONS

INVENTIONS commercialized. Patented or unpatented. Write, Adam Fisher Mfg. Co., 582 Enright, St. Louis, Mo.

INVENTIONS WANTED—Patented, Unpatented. If you have an idea for sale, write, Hartley, Box 928, Bangor, Maine.

OUTBOARD MOTORS

TEN ways to pep up your Outboard Motor. Send coin or money order. Outboard Development Co., 3118 Broadway, Indianapolis, Ind.

PERSONAL

TOBACCOQUIT — Used merely by rinsing the mouth. Eliminates the taste for tobacco entirely. Two dollars if successful, otherwise free. Hydrous, 2066 Fifth Ave., New York.

PRINTING

PRINT your own cards, stationery, circulars, advertising, etc. Junior Press $5.90, job presses $11, rotary $149. Print for others; big profit. Easy rules furnished. Write for catalog presses, type, paper, etc. Kelsey Company, Q-57, Meriden, Conn.

RACING CARS

2 DIRT Track Race Cars, Ford and Essex complete, will sell cheap. Also fast Ford motor. Clay Buschmann, 209 Fair Oaks Street, San Francisco, Cal.

STAMPS

300 DIFFERENT stamps 20c. Michael, 942 So. 23rd, Bellwood, Ill.

CLASSIFIED ADVERTISEMENTS—CONTINUED

96-PAGE Illustrated Stamp Album and 100 different stamps—25c to approval applicants. Ohio Stamp Co., Dept. M, Box 249, Cleveland, Ohio.

FORTY different United States stamps with price list, 12c. Seidenberg, Baroda, Mich.

PENNY approvals. 5,000 Liberia, Nyassa, Congo, Sudan, etc. Also 14,000 averaging 1½c. References. Philatelic Exchange, Huntington, W. Va.

200 Different Stamps 10 cents; big price lists; 60% discount approvals. Covert Stamp, M39 State, Rochester, New York.

MOROCCO Airpost Stamp free with approvals. William Monjar, 1553 Knox, Cincinnati, Ohio.

STAMP COLLECTING

100 Different French Colonial Stamps, 25c to approval applicants. Ohio Stamp Co., Box 249, Cleveland, Ohio.

GIVEN $5.01 Catalog of gold and silver Persians to approval applicants for 29c. Preston Stamp Exchange, 5732 Lexington Ave., Hollywood, California.

50 Different Iceland, Hamburg, etc., 2c. 15 Confederate essays, 10c. Tatham Stamp Co., D9, Mittineague, Mass.

ROOTS AND HERBS

HERB Doctor Book 10c; 250 recipes for making herb medicines. Hazzard Company, Box 41, Vanderveer Park, Brooklyn, N. Y.

SONG WRITERS

SONG Poem Writers—"Real" Proposition. Hibbeler, D198S, 2104 Keystone, Chicago.

TELESCOPES

FOUR foot "Telescope" $1.25 postpaid. Telescope Company, 721 Magoffin, Lexington, Kentucky.

SALESMEN WANTED

SELL 3A Garage door holders, simple, automatic, quickly installed. Interests garage owners, builders, everybody. Exclusive territory proposition. Knowlson - Stevenson Co., Dept. C, Ann Arbor, Mich.

TRADES

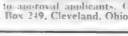
WILL trade like new Victor Amateur Motion Picture Camera for first class used Henderson motorcycle or airplane motor. Roy E. Robbins, P.O. Box 84, Weldon, Ohio.

WANTED: MISCELLANEOUS

MAIL us your discarded jewelry, gold, crowns and bridges, watches, diamonds, silver, platinum. Money promptly mailed. Goods returned if offer refused. United States Smelting Works (The Old Reliable), Dept. 21, Chicago.

Andy Asks a Question

(Continued from page 28)



transportation sometime in the future, but in the meantime a very small percentage of the world's population are converted to them as to their own personal enjoyment and as a pastime or a sport for the whole family. I dare say there are a lot of articles that you could publish that would keep a lot of readers interested and also bring in new readers too. Boat racing is rapidly coming to the front, this offers a wide field for discussion, such as plans, ideas, etc. Of course you will say that I am taking too much liberty and that what you publish is none of my business, but I am giving you what I think is the opinion of many another reader beside myself.

Thanking you,
C. V. Haitche.

* * *

There! That's what we are. I think, though, CeeVee, that you are right to some degree. But—Here's what I contend: interest in things mechanical overlaps from one field to another. No one can be provincial these days. What goes big in the air should be interesting to all, just as boats, motors, cars, motorcycles, and even radio—all have functions in common. Right now it's too hot to argue.

* * *

And as I finish writing this, I run across the letter Jack Hedge, of California, sent me. He says:

Some of the fellows who are giving you a squawk about not publishing this or that are over enthused in his pet subject. I am all hot for light planes, but I find untold interest in every page of M.-M. In fact I've liked it so well from the first issue I read that I used to inquire for it at every news stand that did not have it, just to boost it. . .

Jack had one or two other things to say, and I had to answer the bulk of his epistle with me own type mill. Hosanna! There're friends, people!

This barber pole has me worried. One of the Win Your Wings contestants got up a swell chamois bound set of answers and dedicated his volume to me, using the barber pole as a motif. Wonder if I am supposed to be a clown, or a shavetail, or whether he has me pegged as a dead charlatan. Too deep for me; if I knew what it meant I wouldn't run it.

* * *

From Gernot Heineman, M-M reader, of Bellingham, Wash., comes the shot of the outboard engined plane. It is the product of Gernot's own ingenuity. We knew somebody would try the stunt some day. Elsewhere I show the gear idea he uses. This is late news.

(Continued on page 34)

How to Get into AVIATION *and* . . . make good

U. S. Department of Commerce approved School for Transport, Limited Commercial, Private Pilot, Ground and Flying.

Of all the Von Hoffmann graduates making good in Aviation, many were in the same position a year ago as you are now. They had the ambition and determination to enter this most profitable field and make good.

They selected this School because they knew Von Hoffmann graduates are recognized in the Industry as outstandingly well trained. The training they secured assured them of success.

This is why their early dreams are a realization, and they are now piloting, building and repairing airplanes . . . holding responsible positions at good salaries.

Von Hoffmann Courses generously exceed government requirements. Training is given on late types of planes, and most modern and complete ground equipment at reasonable prices. If you need it, a liberal Time Payment Plan is available. Mail the coupon and learn how to make your start on the road to a successful and prosperous career— NOW.

Located on the famous $2,000,000 Lambert St. Louis airport.

Von Hoffmann
AIRCRAFT SCHOOL
233 Lambert St. Louis Flying Field
ST. LOUIS, MO.

VON HOFFMANN AIRCRAFT SCHOOL
233 Lambert St. Louis Flying Field,
St. Louis, Missouri. MAIL TODAY

Name _____

Address _____

City _____ *State* _____

Age _____ *I am interested in*

☐ *Flying Course* ☐ *Mechanics Course*

☐ *Welding Course* ☐ *Home Study*

You Can Learn HYPNOTISM ...or No Cost Try FREE 5 Days!

DON'T be unpopular, lonesome, or unhappy a minute longer. Now you can make your life what you want it to be—how you can win admiration, success and big money—through the strange power of hypnotism. I'll show you how to use this great force to help you master every situation or *The Five Day Trial is FREE!*

In just a few hours I'll teach you the hidden secrets of Hypnotism—the methods used by the great operators—the amazing things you can accomplish once you understand this mighty power. You can use it to overcome obstacles, achieve your fondest ambitions and become MASTER of yourself, friends and acquaintances—either sex. See for yourself how Hypnotism can banish fear, worry and opposition—improve your memory—increase your earnings—and *force* others to give you the good things in life you deserve!

In the startling NEW book *The Science of Hypnotism*, the world famous hypnotist—Prof. L. R. Young—reveals the most carefully guarded secrets of this fascinating subject. He not only explains the methods of noted hypnotists, step by step—but tells clearly all about the nine stages of hypnotism, the Hypnotic Mirror, Mental Telepathy, how to select your subjects, magnetic healing, methods of hypnotising, how to awaken the subject, how to make money out of hypnotism!

Mysteries of Hypnotism Revealed

How to Hypnotize at a Glance
Susceptible Subjects
How to Hypnotize by Telephone
How to Give an Entertainment
How to Make Others Obey You
Overcoming Bad Habits
How to do Dozens of Hypnotic Tests
Use of Hypnotism in Operations

Try 5 Days FREE—Send No Money

So confident are we that Prof. Young and his great book will quickly teach you the science of hypnotism, that we will send you a copy without one cent in advance! Simply clip and mail the coupon below. When the book arrives pay the postman the special low price of $2.50 plus few cents postage. Then test the power of Hypnotism 5 days! If not amazed and delighted return the book and money will be refunded at once! Mail the coupon now.

FRANKLIN PUBLISHING CO.
800 N. Clark St., Dept. L-423, Chicago

Franklin Publishing Co., Dept. L-423,
800 N. Clark St., Chicago, Illinois.

Please send me your amazing new book The Science of Hypnotism—by Prof. Young. When the book arrives I'll pay the postman only $2.50 plus postage. If I am not satisfied after 5 days' trial, I may return the book and you are to refund my money.

Name.....

Street and No.....

Town..... State.....

If you are likely to be out when postman calls, send $2.50 with coupon and we'll pay delivery charges. Canadian customers outside U. S. must send cash with order.

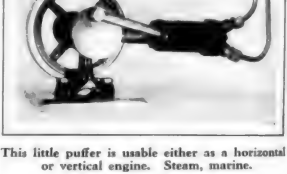
Andy's Line o' Gossip

(Continued from page 32)

SUBURBANITES on Lake Michigan have a novel air mail pickup. Sacked, air mail is placed between two fishpoles on an outboard hydro, and the big city mail plane swoops down, grabs the tanktown letters and sachets onward,—non stop. Swell idee.

* * *

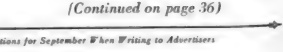
In case you wonder: the jackpot on the straw ballot which you won for me, consisted of the price of a haircut!



This little puffer is usable either as a horizontal or vertical engine. Steam, marine.

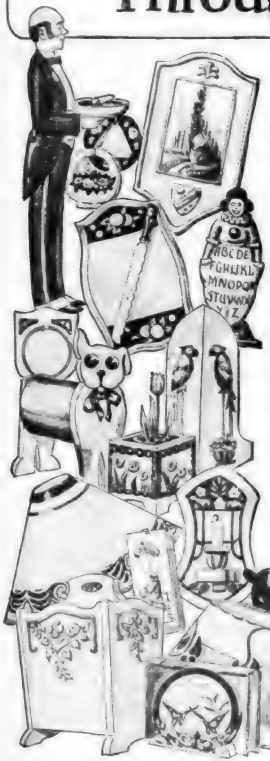
* * *

THINGS I've got to tell you: Gary Cooper reads this line o' type and likes it. I read it and don't. Johnny Lenaghan, 160 Ouimet Ave., Ville St. Laurent, Quebec, which is near Montreal, says to anyone in that vicinity to fly in for a visit to his establishment. The only thing to drink in hot weather is buttermilk, because it has no fatty content and will therefore produce no heat. Esten Moen, of Fosston, Minn., who has submitted and sold many scripts along electrical lines to the eds of this w.k. sheet, runs a column on his local paper. Claire Windsor paid this office a visit not so long ago. No, she doesn't read the shop mail box. Bet if she'd listen to me tell how I felt about her she'd be an andyfan for life.



(Continued on page 36)

A Fascinating New Way To Make Money Through The Arts!



free of extra cost

Our amazing new plan tells how you can get every one of the beautiful gift-wares illustrated here with all instructions for decorating. Mail coupon for Free Book and Offer.

Want Some Money? Here's a wonderful way to get it. Our beautifully illustrated book tells how. It tells all about our new methods of art decoration, art treatment, and how anybody can learn without previous experience. It tells how you can get the full assortment of gift-wares and objets d'art shown on this page without one cent of extra cost, how we start you with this assortment and set you up in business. Contains page after page of color illustrations of what you can make and sell. You can make good money and this book is—

FREE Our system is amazingly easy to learn and the profits are larger than in almost any other business. You can produce beautiful objects almost from the start. Best of all you don't have to know how to draw for we show you the famous "3-Step Method." Begin making money now! All supplies are sent by us with instructions and many have made from $10 to $25 a week. Many society women do this work for their own amusement. But either way—pleasure or profit—it's the most delightful home work you can imagine. Don't miss this opportunity to get all these gift-wares free of extra charge. Send now for your copy of this valuable book. It's FREE.

FIRESIDE INDUSTRIES
Dept. 142-M
ADRIAN, MICH.

GOOD for OFFER

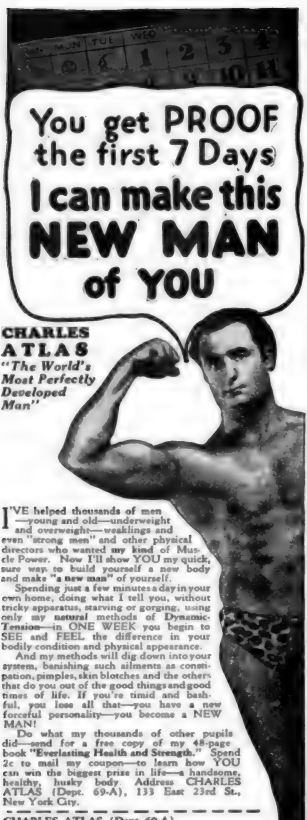
Fireside Industries
Dept. 142-M
Adrian, Mich.

Gentlemen: Send me free book and complete plan for making money.

Name .....

Address .....

City ..... *State* .....



I'VE helped thousands of men —young and old—underweight and overweight—weaklings and even "strong men" and other physical directors who wanted **my** kind of Muscle Power. Now I'll show YOU my quick, sure way to build yourself a new body and make "a new man" of yourself.

Spending just a few minutes a day in your own home, doing what I tell you, without tricky apparatus, starving or gorging, using only my **natural** methods of Dynamic-Tension, in ONE WEEK you begin to SEE and FEEL the difference in your bodily condition and physical appearance.

And my methods will dig down into your system, banishing such ailments as constipation, pimples, skin blotches and the others that do you out of the good things and good times of life. If you're timid and bashful, you lose all that—you have a new forceful personality—you become a NEW MAN!

Do what my thousands of other pupils did—send for a free copy of my 48-page book "Everlasting Health and Strength." Spend 2c to mail my coupon—to learn how YOU can win the biggest prize in life—a handsome, healthy, husky body. Address CHARLES ATLAS (Dept. 69-A), 133 East 23rd St., New York City.

CHARLES ATLAS (Dept. 69-A)
133 East 23rd St., N. Y. C.

I want the proof that your system of **Dynamic-Tension** will make a **New Man** of me—give me a healthy, husky body and big muscle development. Send me your free book, **"Everlasting Health and Strength."**

Name .....

Address .....

City and State .....

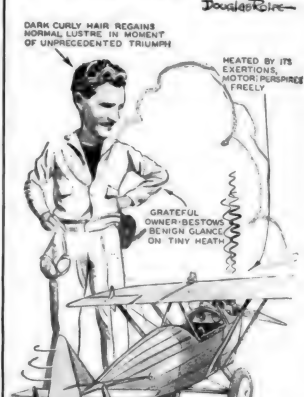
(Please print or write plainly)

Andy Describes Dramatic Solo

(Continued from page 34)

EXPERIENCES of Lightplane Pilots: Westy Farmer, who flies a Heath Parasol had been flying a Waco until he got his ship a year ago in August. The change

Douglas Rolfe



MIRACLES OF MECHANICS — EDITOR OF POPULAR PUBLICATION SOLOS FREELY IN DIMINUTIVE PLANE

from a Waco to the Heath was made with little trouble. Then one day Westy tries a little taxiing, and finds that the Parasol at half throttle is flying four feet off the ground, and that if the gun is cut he'll smash into a line of cars. He cuts the gun, kicked the rudder, and ground looped both tires off. Next time he flew it he jammed the throttle "off" so hard when he was coming in to land that the motor gasped for breath and had to quit for lack of juice. From about 100 feet he made a glide with the dead stick right up and down. Everybody on the field had a bad ten seconds, but the grass didn't bother the stick and the ship made a pretty three point.

Douglas Rolfe, M-M artist, has pictured the aftermath scene as it appeared to him, an eye witness.

What could be easier!

Play any instrument in a few short months

...learn this delightfully simple way

LEARNING music is no longer a difficult task. If you can read the alphabet, you can now quickly learn to play your favorite instrument! A delightful new method has made it positively easy to read and play music within just a few months. And the cost is only a *fraction* of what people used to spend on the old, slow methods!

You don't need a private teacher. You study entirely at home, in the privacy of your own room, with no one to interrupt or embarrass you. And strange as it may seem; you'll enjoy every minute of it—because the new method is *agreeable* as well as *rapid!*

No Tricks or Stunts—You Learn from "Regular" Music

You don't have to know the first thing about music in order to begin. You learn to play from actual notes, just like the best musicians do. And almost before you realize your progress, you begin playing real tunes and melodies instead of just scales. There are no trick "numbers," no "memory stunts." When you finish the U. S. School of Music course, you can pick up any piece of regular printed music and play it! You'll be able to read music, popular and classic, and play it from the notes. You'll acquire a life-long ability to please your friends, amuse yourself, and, if you like, make money. (Musicians are highly paid for their pleasant work.)

Whether you like the piano, violin, 'cello, organ, saxophone, or any other instrument, you can now learn to play it in an amazingly short time. By means of this wonderful newly perfected method reading and playing music is made almost as simple as reading aloud from a book. You simply can't go wrong. First, you are told how a thing is done, then a picture shows you how, then you do it yourself and hear it. No private teacher could make it any clearer. The lessons come to you by mail, at regular intervals. They consist of complete printed instructions, diagrams, all the music you need, and music paper for writing out test exercises. And if anything comes up, which is not *entirely plain* you can write to your instructor and get a full, prompt, personal reply!

Choose Your Course

Piano	Violin
Organ	Clarinet
Ukulele	Flute
Cornet	Saxophone
Trombone	Harp
Piccolo	Mandolin
Guitar	'Cello

Hawaiian Steel Guitar
Sight Singing
Piano-Accordion
Italian and German Accordion
Voice and Speech Culture
Harmony and Composition
Drums and Traps
Automatic Finger Control
Banjo (Plectrum, 5-String or Tenor)

The Surest Way to Be Popular and Have a Good Time

Do you sit "on the sidelines" at a party? Are you out of it because you can't play? Many, many people are. It's the musician who claims attention. If you play, you are always in demand. Many invitations come to you. Amateur orchestras offer you wonderful afternoons and evenings. And you meet the kind of people you have always wanted to know. So don't miss this exceptional opportunity.

Free Book and Demonstration Lesson

The whole interesting story about the U. S. School course can not be told on this page. So a booklet has been printed—"Music Lessons in Your Own Home." You can have a copy absolutely free by mailing the coupon below. With it will be sent a free demonstration lesson which shows better than words how delightfully quick and easy this wonderful method is. If you are really anxious to become a good player on your favorite instrument, mail the coupon now—today. Instruments supplied when needed, cash or credit. U. S. School of Music, 2629 Brunswick Bldg., New York City.

U. S. SCHOOL OF MUSIC
2629 Brunswick Bldg., New York City

Please send me your free book, "Music Lessons in Your Own Home," with introduction by Dr. Frank Crane. Demonstration Lesson and particulars of your easy payment plan. I am interested in the following course

Have You Instrument?

.....

.....

Name .....
(Please write plainly)

Address .....

City ..... State .....

Crashing MODELS for

Miniature models, full-size models, working models of all kinds are used by movie makers to reproduce those startling plane crashes and train wrecks which thrill you on the silver screen. Dick Cole takes you behind the scenes with the thrill makers and shows you some of the miracles.

SO PERFECTED has become the art of movie modeling that few picture patrons can tell when they are seeing a natural set or a miniature. Of course, their logical reasoning tells them that the Zeppelin they see burst into flames and catapult to the earth, is not a *real* Zeppelin. Yet their eyes alone can not decide the real from the unreal. The old adage: "Seeing is believing," is strictly passé in the motion picture production game.

Nothing is beyond the scope of the movie modeler. No doubt when the 200-inch lens telescope is completed on Mt. Wilson, a movie modeler will take a squint at Mars, make some model sets, and we Earthly people will be entertained with Martian pictures.

But even at the present time, the use of models in picture production is far greater than the average person believes. Perhaps a director looks over a scenario given him to produce. The villain—curses on him—cuts the main rivets of a bridge. Toot! Toot! The train comes 'round the curve! Onto the bridge! When it reaches the middle of the structure, the massive girders are seen to twist . . . snap! The train, with locomotive belching black smoke and steam, plunges down, crashes through the ice, and disappears in the black water of the river.

Is the director fazed when he reads this? Not at all. He reaches for his telephone.

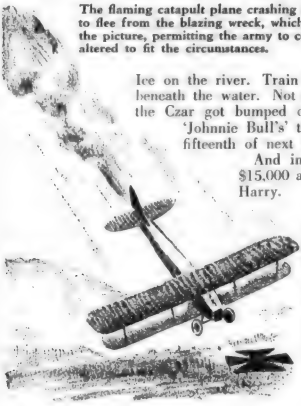
"Hello! Harry Reynolds? . . . Look, Harry. You gotta put a train through a bridge for us. Winter scene. Lots of snow.

Many plane crashes are enacted by skilled stunt pilots such as Dick Grace. Sometimes, however, it would be suicide for a pilot to attempt the stunt pictured in which a flaming plane is crashing to the ground. This plane is a full size model without motor or propeller, and is catapulted over the edge of a cliff to crack up in front of the cameras.

MOVIE Thrills

by DICK COLE

The flaming catapult plane crashing to its doom. The soldiers at the right are turning to flee from the blazing wreck, which was supposed to crack up farther to the left in the picture, permitting the army to continue forward on the march. The scenario was altered to fit the circumstances.



Ice on the river. Train breaks through and disappears completely beneath the water. Not a U. S. train. The set is in Russia before the Czar got bumped off. You know, compartment coaches like 'Johnnie Bull's' trains. . . . Yeah! . . . Yeah! By the fifteenth of next month. . . . Right, oh! See you later."

And in those few words Harry Reynolds gets a $15,000 assignment. Does he fill it? Just leave it to Harry.

Just who is this Harry Reynolds, anyway? Picture patrons never heard of him. Yet it is his masterful, ingenious touch that has thrilled millions of people. Scarcely a big, spectacular picture has been put out in recent years, to which he has not contributed his art. His name is prominent on the private telephone list of every director in Hollywood. I don't know just what handle to put on his name, but it seems that "model technician" fits him perfectly, so it is quite fitting that he should be chair-

Trigger at End of Catapult Sets Fire to Oil Soaked, Pilotless Airplane

This is the full size model plane resting on the catapult from which it was launched. Note absence of propeller and dummy motor. A trigger at the end of the catapult ignited the oil-soaked plane.

man of the technical board of the American Society of Model Engineers.

After accepting the assignment, what next? Harry has on hand a number of models of North American locomotives and coaches. But the scenario calls for a Russian train. That means research. Telegrams are shot out to various information sources, and in several days airplane mail brings him photographs, detail drawings and specifications. He even learns how far apart the Russian engineers space the telegraph poles; the style of cross-arms and insulators used; the prevalent style of bridge construction.

With all the statistical dope at hand, Harry gets busy. A stock model American type locomotive with three driving wheels on each side is re-designed to the Russian standard. Different funnel, domes, cab, cowcatcher, boiler pumps, etc. On the coach chasses, Russian compartment coach bodies are built. Also a box-like "guard's van"—in common Yankee words, a baggage car. Automatic couplers are removed and replaced with spring bumpers that look like big collar buttons.

Now for the bridge construction. First a river bed about six feet deep is dug. On the banks of the "river", the abutments of the bridge are erected. These are made of small blocks of tile to imitate the stone. Even these blocks of tile, as well as every piece and every dimension that enters into the model set, is held fixedly to a scale of one inch equals one foot. So, the model bridge shown in several photographs, which is actually 20 feet long, between abutments, and 4½ feet above the water, is representative of a bridge 240 feet long and 54 feet high. When every object that makes comparison possible is removed, the diminutiveness of the bridge can not be detected.

One would probably guess, to look at the construction, that the bridge was made of sheet metal stampings. Not so. The girders are cast. Not of iron, or brass, or even of aluminum. But of a low fusing alloy of tin, bismuth and cadmium—practically the same alloy as is used on automatic sprinklers in buildings. This low fusing alloy permits plaster of paris to be used for the mold. Rather than making the usual pattern, as does a founder, the mold is "scratched" out with tools not unlike an engraver's tools. A little indenture with a prick-punch in the mold shows up as a rivet-head on the casting.

With all the mechanical fixtures complete, the next job is to doll up the physical surroundings. The river bank is formed to look natural, and the man-made river bed

This seemingly terrific explosion is the result of a lone stick of dynamite going off under several hundred pounds of finely powdered lampblack. Visually it was a tremendous explosion; actually, rather a mild one.

is filled with water to the desired level. Ice? How is it formed? Don't laugh, reader. The ice is melted paraffin poured on the water, where it hardens into a nice crust that exactly imitates real ice. Snow? Fine, sifted, bleached salt and talc. A big blower creates a gale of wind across the set. The "snow" is sifted into the "wind," and settles down on the set in a natural manner—drifts and bleak, bare spots.

Everything is ready for the camera man. Steam is got up in the locomotive — of course, it is an honest-to-goodness steam engine—and, at a signal, the train starts on its road to doom. Round the curve it comes; drivers lashing, funnel belching black smoke, steam hissing around the piston rods. Toot! Toot! The whistle blows for the approach to the bridge. Onto the bridge! A close-up shot shows the middle girder twisting! It parts! The bridge collapses! The train plunges down! Great cakes of ice literally stand on end as the locomotive crashes through. A cloud of steam arises. The coaches follow the engine into the black water. And a celluloid record is made.

Not a little credit for the realistic effect is due to the camera man. As long as the movement of the train is horizontal, the picture can be shot at normal rate, about sixteen frames a second. The ratio of the movement of the train is the same as the scale—12 to 1. But when the train falls, the ratio is all upset. The force of gravity will not obligingly accommodate itself to the scale. Obviously, a bridge 54 feet high would take a few seconds in falling. But the model would fall 4½ feet in a fraction of a second. So the vertical movement is shot with a high speed camera, which reproduces the slow motion pictures—the kind where the steeple-chaser seems to float over the stone wall. This contributes the realistic effect to the falling. The change from the normal movement to the retarded movement can not be made abruptly without detection. So a close-up shot of the twisting girder is interposed between. The girder

Train Crashing Thru Bridge Thrills Movie Fans—Here's How It's Done

Model train approaching a bridge through which it is to crash. The locomotive runs on real steam, but an electric motor is hidden in the car indicated by arrow to make sure that all the cars will go over.

Close-up of the model train, with Harry Reynolds, Hollywood's most famous model engineer, at the extreme left, pointing out features of his remarkably accurate locomotive model to several assistants.

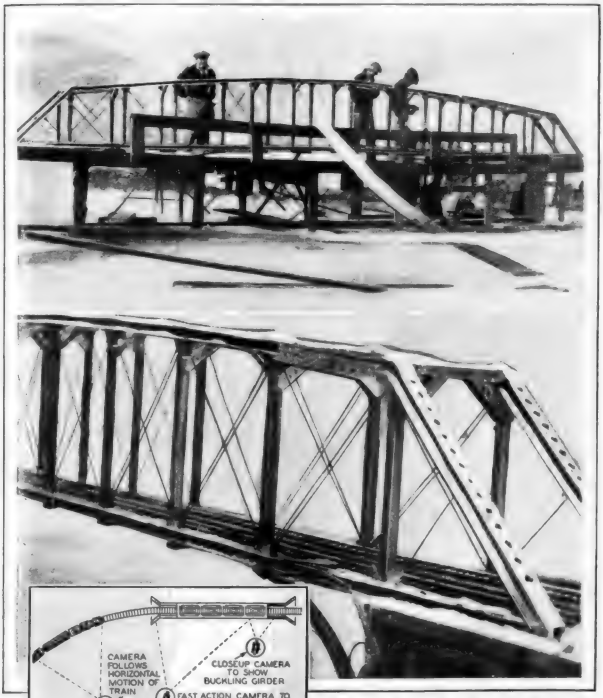
that breaks is of soft lead of predetermined strength. The moment it parts, the high speed camera takes up the action of the falling structure.

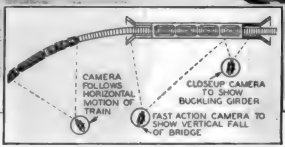
In the months that follow, millions of picture fans gasp in awe as they witness the appalling catastrophe. If every added heartbeat that Harry Reynolds' art has produced were a foot of string, it would make a loop around Mars and a half-hitch around the moon.

The model set described in the foregoing is from the picture: "The Last Command." Perhaps the enterprizing press-agents conveyed the idea that a real train was used—that oodles of money was spent creating the spectacular wreck. Well, a real—model—train was used; plenty of kale was spent; and press-agents have a special writers' license, anyway.

Other pictures to which Harry Reynolds has contributed his remarkable art are: "Old Ironsides," "Behind The Front," "Wings," "Hell's Angels," and many other pictures in the making, but not yet released.

The "huge" army tank shown in "Behind



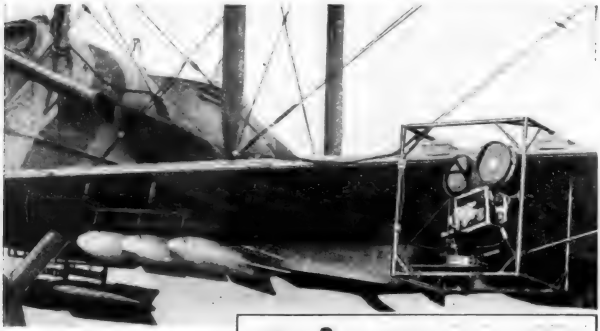


How cameras were arranged to picture train wreck.

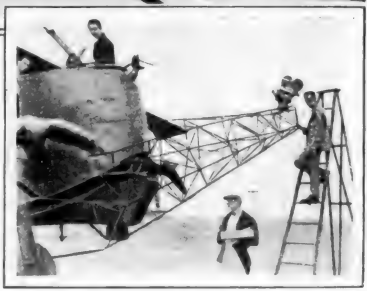
These two photos give some idea of the accuracy required in building models for movie use. The photo above is so realistic one would hardly suspect it to be a model!

The Front" was a masterpiece of modeling ingenuity. No doubt many readers are surprised to learn that the battlefield they saw in that picture was a miniature, and the tank, a model.

But such a model! Mr. Reynolds held a high commission rank during the war, and was associated with the engineering forces —mostly with the experimental department —and possesses a wealth of knowledge of mechanical devices of which we ordinary people have only an inkling—non-recoil guns, aerial bombs, remote control of torpedoes, and, of course, super-tanks. So it is little wonder that he created a tank and battle-field that held the spectators breath-



How a camera is mounted on the under wing of a plane to follow the progress of bombs dropped from the rack. Set in action from the plane's cockpit, the camera shows the bomb dropping until it strikes the ground.



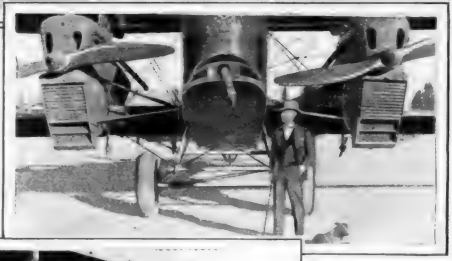
To show what was happening in the gunner's cockpit of this German Gotha, the camera had to be anchored to this metal mount far out in front.

less. The tank was operated with an electric motor, supplied by an invisible, trailing cable. Conspicuous ingenuity was shown in the firing of the guns. Contained within the tank was a steel cylinder of highly compressed air. Cams, actuated by the movement of the tank, intermittently opened valves at the breech of the guns. Little vibrating hoopers within the tank contained a mixture of aluminum powder and talc. This powder was sprinkled at the breech of the guns, and was blown out the muzzle by the blast of compressed air. This method permitted the firing of hundred of "shots." And the highlights from the aluminum powder had a better photographic value than an actual burst of flame from a real gun.

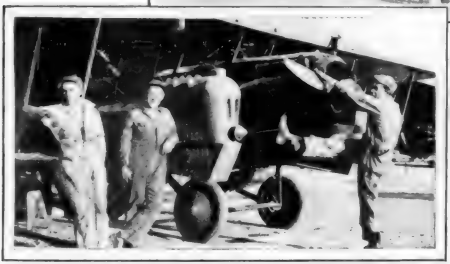
Motion picture models are not always diminutive. In "Hell's Angels," the huge, spectacular picture on current release, which far out-classes all of its fore-runners in the bigness of its conception and presentation, a giant bombing plane, representative of a German Gotha, plays a salient role. Ingenious camera mounts, attached to various points of this huge plane, record an aerial battle which is breath-taking in its realism.

Ultimately the bomber is shot down in flames. Obviously the massive bombing plane, not designed for stunt maneuvering, could not be handled to give a realistic falling effect. So Harry Reynolds was called upon to convert a single-motored biplane into an exact replica of the German Gotha. Several photographs show how cleverly this was done. The smaller, easily maneuvered plane, carrying a smoke bomb, and handled by a skillful stunt pilot, falls from out the sky in a series of tail-spins and slips. Since

These pictures show an interesting use of models so large that they hardly seem to deserve that description. The German Gotha, shown above, is a genuine bomber which figures prominently in the great air spectacle, "Hell's Angels." When the plane was ultimately shot down, a smaller model was used.



Front view of the Gotha, interesting for comparing with the model at the left. Note the twin motors and machine gun projecting from the nose of the gunner's cockpit in the center.



This is the model of the Gotha used for the scene in which the bomber falls to its doom. It is a standard biplane equipped with dummy motors and single propeller in the center.

there are no objects near for comparison, the transposition of the planes can not be detected.

Have you ever wondered how close-up shots of an aeroplane in flight are taken? Perhaps a close-up underneath the wings showing the release of an aerial torpedo? Or a close-up in front of the propellers showing machine guns in action? Several photographs reveal the secret. Automatic cameras are mounted on a skeleton framework of duralumin, and can be started and stopped at the will of the operator in cockpit.

Mr. Reynolds frequently co-operates with that dare-devil, Dick Grace, the famous "crack-'em-up" technician, who wrote that interesting article of his experiences for MODERN MECHANICS several months ago. In fact, it's a common expression in Hollywood, that "Harry makes 'em, Dick breaks

(Continued on page 183)

Daredevil Goes Over Niagara Falls in Special Steel Barrel

Above is shown Red Hill with the steel barrel which he used in negotiating the treacherous Niagara rapids and in shooting over the falls.

VERY few people go over Niagara Falls and live to remember it. Most of those who went over the edge for a supreme thrill, went simultaneously to oblivion. When Red Hill, Canadian daredevil, went over in his specially constructed steel tank, however, he made history, instead of a mess.

Previous to his latest exploit he succeeded in navigating the treacherous upper and lower rapids of the falls. When he negotiated these perilous trips he was strapped into his tank, as shown in the drawing at the right.

The padding and bracing of the tank are so arranged as to protect him from any severe jolts. A heavy belt around the waist, supported by elastic bands, takes up the heaviest part of the shock, while hand and foot braces absorb the remaining jar.

Hill was strapped in the tank and braced during his trip as shown above.

Hill fell the height of Niagara Falls, 196 feet, in his steel barrel and lived to tell about it.

Sun Forecasts Hurricanes

IN THE future it may be possible to forecast hurricanes by recording the intensity of sunlight, is the belief of an eminent meteorologist of Washington, D. C. Sunlight decreases in intensity before a hurricane is about to strike, it was found in observing the nature of the weather.

Speed King Gives Life to Capture Motor Boat Record

Above: The Miss England II speeding over the surface of Lake Windemere at better than 100 miles an hour a few seconds before the fatal crash which killed Segrave.

The record-breaking hydroplane as she appeared after being raised to the surface. The jagged hole in the forward plane was caused by a log.

Major Segrave is shown adjusting his specially designed safety belt which failed to save his life.

SIR HENRY SEGRAVE, holder of the world's auto speed record, acquired the world's motorboat speed record recently at Lake Windemere, England, but he died doing it. After running the speed of his hydroplane, *Miss England II*, up to slightly over 101 miles per hour, he struck a submerged obstruction and was killed by the terrific impact when his body was thrown out into the water.

The great speed attained by the boat gave an enormous impetus to the bodies as they were thrown out of the speeding boat. In spite of his steel safety jacket, Segrave had a number of ribs broken and his lungs punctured, so that he died five hours later in the hospital. One of his mechanics was drowned and the other was severely injured.

Miss England II was powered by two 2000 H.P. Rolls Royce engines geared to a single propeller turning over 12,000 R.P.M.

How I Broke the World's

Lieut. Soucek's Wright Apache plane starting its record climb over Washington.

MORE than 8 miles above the earth's surface, in a region of terrific cold, where life itself depends on "canned air," airtight clothing and electrically heated goggles, I fought, on the afternoon of June 4, 1930, a successful battle of two hours and five minutes against nature to gain for the Navy and the United States a new world's altitude record.

For purely sentimental reasons, my latest climb of 43,166 feet, which broke the world's record for all kinds of planes, previously held by Willi Neuenhofen, of Germany, who flew 41,794 feet on May 25, 1929, was made on the exact anniversary of my flight of June 4, 1929, when I was fortunate enough to establish a new world's record for seaplanes of 38,560 feet.

My seaplane record was made in a single seater Wright Apache plane, the very same ship that I used in my new world's record flight, except

Lieutenant Soucek receiving congratulations of Rear Admiral Moffan. Middle photo shows Soucek in cockpit at start of flight.

Altitude Record

by Lieut. Apollo Soucek U. S. N.

On June 4, 1930, Lieut. Soucek flew a Navy plane to a height of more than eight miles to establish a new altitude record. Here he tells his story of his thrilling ascent to the roof of the world.

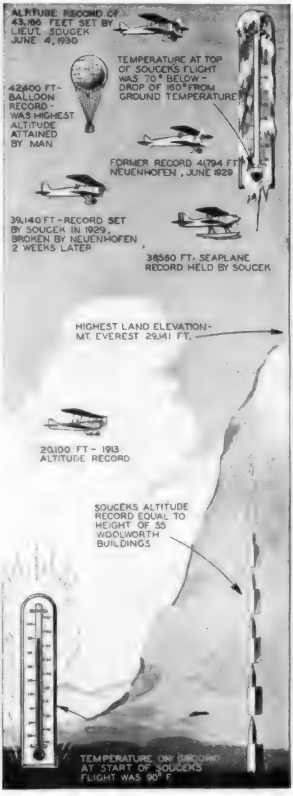
that in the former case it was equipped with pontoons instead of wheels. Moreover, I also used this plane on May 8, 1929 when I established a world's record for all types of planes by reaching an official altitude of 39,140 feet, the mark which Neuenhofen broke only 17 days later.

Certainly the afternoon of June 4 seemed almost ideal for my climb. True, the temperature near the ground was well over 90 degrees, and the air a few hundred feet off the ground appeared somewhat hazy, but these factors were not important enough, as I found later, to interfere with flying conditions at great altitudes.

Just a few words about the equipment I used and we're off! I wore, as usual, a fur-lined leather suit, but nary a stitch of underclothes, the fur being next to my skin. Commander Frederick Ceres, flight surgeon at the Naval Air Station at Anacostia, D. C., figured this one out from the clothes of the Eskimos.

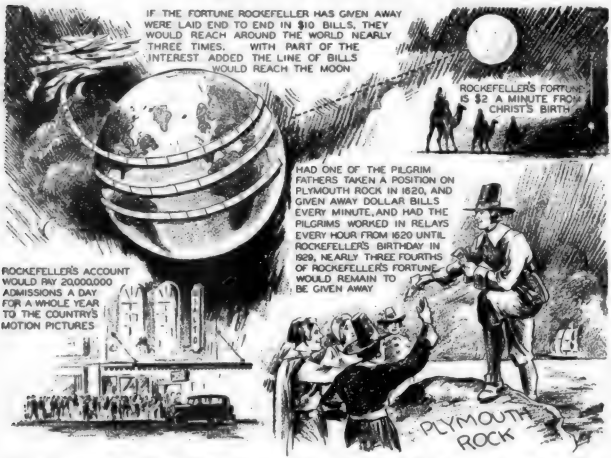
Of course, I also wore a heavy helmet, a pair of heavy, wool-lined boots, and a pair of electrically heated goggles especially devised by my brother, Zeus, recently resigned from the Navy. But probably the most interesting contraption of all was the so-called "artificial lung" which I developed, with the aid of some loyal co-workers, to aid me in getting the right amount of oxygen at high altitudes. By long experience I had learned that at 40,000 feet or higher the pressure of the air is much less than the pressure in the pilot's lungs, with the result that when the oxygen from the ordinary type of oxygen feeding device flows into his mouth, his lung pressure tends to force it right out again. So not long ago I extended the breath outlet tube a couple of feet and then sewed the bottom onto my control stick. The point is to build up a pressure in this tube equal to

(Continued on page 180)



High spots in Lieut. Soucek's great record in altitude flying are pictured in this diagram. He now holds both the land and seaplane records.

Statistics Made Graphic: A Picture of John D's Wealth



Can you visualize a million dollars? Do you realize that $10,000 is but one per cent of a million? And the glib talk of billions one hears these days! Here is a picture of a billionaire's fortune, showing some of the strange mental yardsticks which are needed to enable us to visualize the enormity of Rockefeller's fortune.

ONE winter night, two eminent financiers made their way homeward along Fifth Avenue, New York City.

C. W. Barron, beloved financial publisher, was one of the men. John Davisson Rockefeller was the other.

As they passed a dim lit, pretentious mansion, John D. inquired of Mr. Barron as to who might be the owner of the huge place.

"That," said Barron, "is the home of Senator Clark, the Anaconda Copper king. The place cost $5,000,000. There is a stairway in the house that is said to have been especially built of marble brought from Italy. It cost $150,000!"

Mr. Rockefeller whistled.

"Where do all of the people get all the money?" he asked.

Which question, asked by the wealthiest man in the world, sounds a bit unusual. As is well known, Mr. Rockefeller owns a fortune staggering to the imagination. Strange mental yardsticks are needed to comprehend the enormity of the wealth Mr. Rockefeller owns.

For instance, if he were only a billionaire, instead of a bi-billionaire, his income would be so great that after giving away, on fifteen street corners, a dollar bill every thirty seconds for ten hours a day, every day of the year, he would find himself with more money than he started with.

His interest income alone exceeds the yearly earnings of 15,000,000 American laborers.

Had $500 a day been credited Adam in the Garden of Eden every day for these 6,000 years, Adam's bank account would today be less than Rockefeller's.

It is equivalent to an income of $2 a minute from the birth of Christ. He has given away $600,000,000.

Rockefeller could send 20,000,000 people, paying their admissions, to the theater every day for a year.

Science's Greatest Adventure

Scientist, adventurer, leader of men, Commander Richard E. Byrd stands as a symbol of the new age of science. He flew over the North Pole and across the Atlantic, but these were only preparations for the great adventure—the Byrd South Polar Expedition. Modern Mechanics is proud to present an intimate pictorial record of the hardships, the routine, and the final glorious triumph of Science's Greatest Adventure. The photos which appear in these pages, telling the story of the expedition, Modern Mechanics is pleased to dedicate to Commander Richard E. Byrd.

Modern Mechanics Presents a Picture

This superb panorama is typical of the majestic landscape of the Antarctic. It is easy to envision the strange charm of this bleak country—the lofty crags of snow and ice, the silhouetted dog team and driver going out into the mystery of this land whose secrets have been locked in ice for ages.

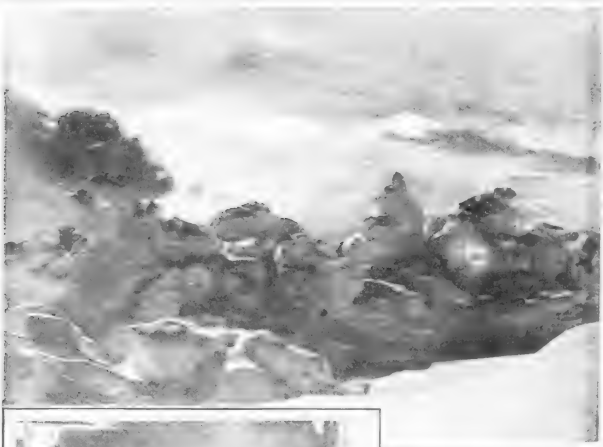
To Richard E. Byrd and his hardy companions of the South Pole Expedition, this section of Modern Mechanics is dedicated. The photos reproduced herewith tell a graphic story of the South Polar Adventure.

WITH the return of Commander Richard E. Byrd and his crew of 80 men from the Antarctic, one of the most dramatic chapters in all history is brought to a close. That the Expedition, which for 20 months ferreted out the ice-locked secrets of the South Polar lands with airplanes, dog teams, and all the instruments of modern science, was an adventure which in its various phases of hardship and discovery ranks with the achievements of Magellan, Columbus, Hudson, and other great explorers, no one will seriously deny.

Yet therein lies the danger that the drama of it all may have overshadowed the solid scientific basis on which much of the Expedition's fame will rest. For Dick Byrd is always the scientist as well as the adventurer.

Well, you ask, just what did Byrd achieve that made the expenditure of a million dollars justifiable? If such justification were necessary—which no scientist, and certainly no adventurer, will admit—it can be pointed out that:

Byrd has claimed in the name of the United States 125,000 square miles of land which he discovered. There is every possibility that there are enormous coal deposits in this land, for the Antarctic was once tropical in climate, as proved by carboniferous deposits secured by Dr. L. M. Gould, geologist of the party, from a 5000-foot mountain top.



Towering ice crags take on flashing colors from the Antarctic sun, making scenes like this weirdly impressive in their beauty.

Commander Byrd relaxed in his office after a hard day's work. The typewriter was used to record scientific data collected.

Three mountain ranges which had never been seen before were mapped and many details added, all through the use of aerial photography. Carmen Land, reported by the Norwegian explorer Amundsen, was proved to be illusory. The Rockefeller mountain range was found to be among the oldest mountains in the world. The expedition discovered the range.

Biologically, many interesting examples of Antarctic vegetable life were brought back for study. Of course, such vegetables were of an exceedingly primitive type. In oceanography numerous soundings charted the bottom of the Polar

Numerous camping expeditions, away from the base at Little America, were made more tolerable by hot drinks to counteract temperatures which sometimes dropped as low as 70 below. At the right the wireless operator of the expedition is tuning in with the world on the short-wave set which kept the explorers in touch with civilization.

seas for the first time. In taking these soundings a special instrument known as the sonic depth meter was used. In principle, it consists of a device which records the time necessary for sound waves to travel to the bottom of the sea and back again, knowing which it is a simple matter to chart the depth.

Ice is superimposed on land to a depth of 1500 feet, it was discovered. The volume of water locked in this immense ice cap is almost inconceivable. It has been estimated that if the Antarctic ice should suddenly melt, the released waters would add an additional two feet

(Continued on page 58)

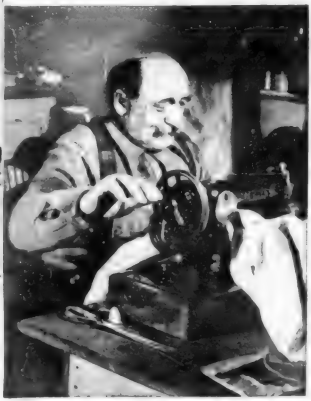
Dog-teams are the universal source of power in polar lands. Here a double team is drawing a heavy boat across the ice, doing their share in writing geographic history.

Sea lions are one of the few forms of life to be found on the borders of the Antarctic continent. Two explorers had a lot of fun weighing this baby sea lion in an improvised scales. And incidentally, more data on sea lions was thereby collected for scientists.

A penguin making friends with two huskies gives evidence of the amiable disposition of his breed. The penguin is a water bird, web-footed, and its rudimentary wings are useless for flying purposes.

Starting out on an exploratory tour, this small dog-sledge army pauses for a picture before leaving Little America. The rigging at the left is that of the ship "City of New York."

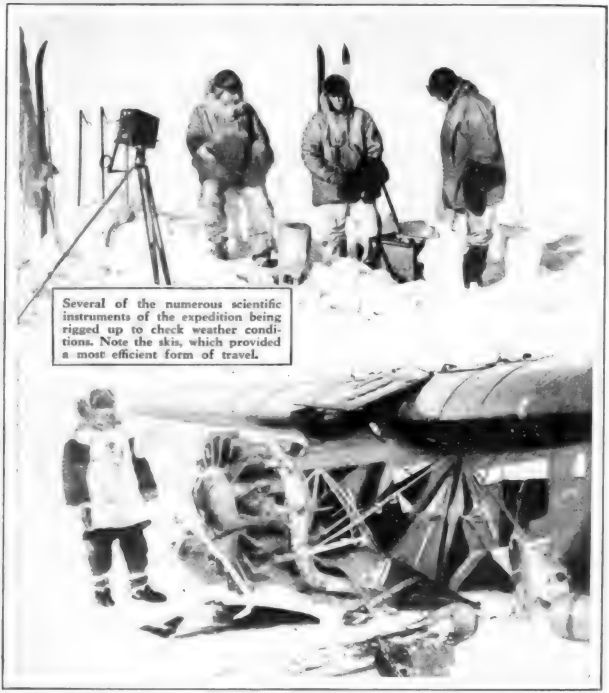
Closeup of a whale coming up for a breath of air. Note the photographer in background. This photo is unique, in that whales normally float full-length on the surface. Owing to the thick ice fields, however, which left only small stretches of open water between them, this whale and his comrades were literally forced to stand on their tails and poke their noses up through the water. The whale is a mammal and breathes through lungs rather than gills. The pit-like depression which can be observed in the forehead is a nostril.



The sailmaker's sewing machine added a domestic touch to the Little America camp, repairing clothing.

The "City of New York" apparently icebound, but in reality anchored off the edge of an ice shelf. The dog teams, several of which can be seen, are helping to reload the ship for the journey home. The loneliness and vastness of the land which the expedition met and conquered is captured in this photograph, in which the limitless ice field stretches off into the distance to merge with the sky.

The "Floyd Bennett," airplane in which Byrd and three companions flew over the South Pole, is shown being tuned up in readiness for the history-making flight. Note pile of empty oil and gas tins.



Several of the numerous scientific instruments of the expedition being rigged up to check weather conditions. Note the skis, which provided a most efficient form of travel.

This wreckage of one of the expedition planes occurred when, after landing some 500 miles from Little America, a blizzard blew up suddenly and sent the plane careening across the ice. The flyers lived on curtailed rations until a dramatic rescue was effected seven days later by Commander Byrd.

of depth to all the oceans of the world.

Meteorological observations made will prove especially important, in the opinion of Commander Byrd, who has pointed out that more bad weather develops from the glacial planes of the Antarctic than from the Arctic Circle. Strategically located stations, therefore, would be able to predict weather conditions for Europe and America by observations taken at the birthplace of storms.

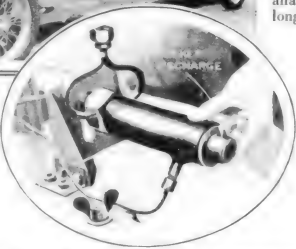
A notable fact about the expedition, and one which tells in itself a complete story of the thoroughness of Commander Byrd in equipping his expedition for all possible contingencies, is that every man in the expedition returned home in better health than when he left.

Rest hour after the day is done, in the snug comfort of the weather-proof camp building. Not all the work was done outdoors, for there was much compiling of scientific data.

All the comforts of home, even to a piano, were included in the equipment. This photo was snapped just after the men's baggage had been transferred from the ship to the camp.

Farewell to Little America! A solemn moment as the flag which had flown for nearly two years was lowered preparatory to breaking up camp for the long trip back home. This flag was the symbol of America's claim to 125,000 square miles of land discovered by Byrd, never before seen by man.

Liquid Air Provides Motive Power for Rocket Automobile



Above is shown Max Valier's rocket car being fueled from the large liquid air tank. At the right is shown the astonishingly small and simple rocket motor used with this type of fuel.

LIQUID air, the coldest substance known to man, was used as fuel for Max Valier's rocket experiments in Germany, and although the inventor was recently killed by the explosion of one of the fuel tanks, experts have proclaimed this device as the solution of the problem of rocket propulsion, as complete control of speed is permitted by the driver.

The motor itself is a tiny affair, being only fifteen inches long, and weighing ten pounds.

No Cold Lost Here

A RECENT patent has been granted on a device which stops refrigeration on electric refrigerators whenever the door is opened.

The importance of this patent, in reducing cost of operation as well as in protecting life, is seen at once. It eliminates expense where the door is left unintentionally ajar or where the apartment is left temporarily vacant. By stopping operation when the door is open it also prevents the escape of poisonous fumes, should the refrigerator contain a leaky unit.

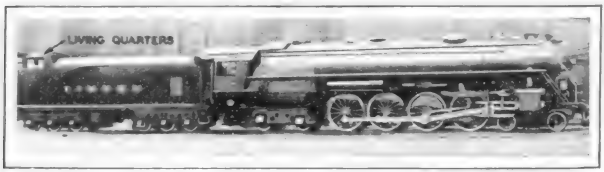
Making Your Own Belt Dressing

MELT together two parts tallow and one part neatsfoot oil to make a good belt dressing. Apply once a month with a brush.

First Roller Bearing Locomotive Has Small Living Quarters on Tender

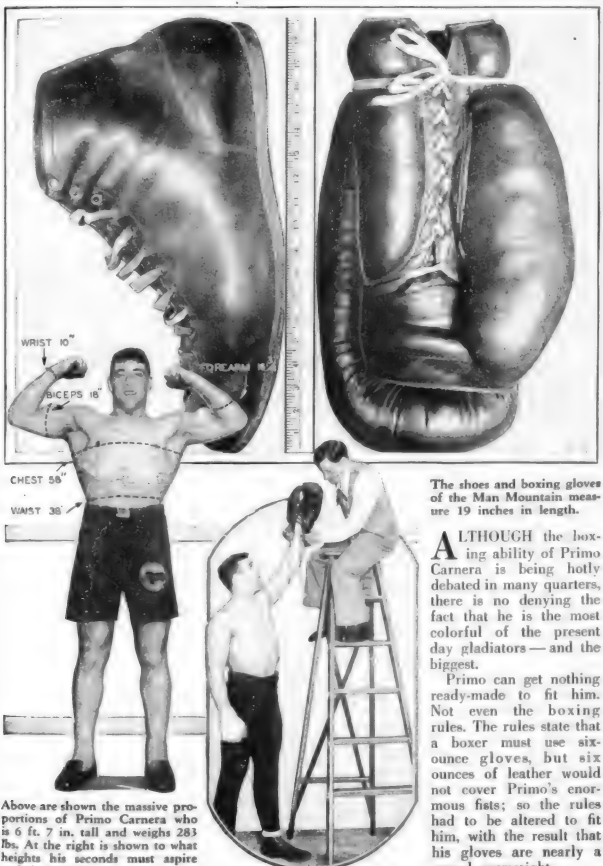
THIS experimental locomotive, which is now being tested by the New York Central Railroad, is the first to be equipped throughout with roller bearings. On the rear of the tender is a small room with windows and containing a bed, electric fan and lights, steam heat, a small desk and other comforts.

The roller bearings are expected to give longer life to the intricate mechanism of locomotives which cost about $150,000 to build.



Both drive and pony wheels on this experimental locomotive are equipped with roller bearing journals.

Not Even The Rules Fit Carnera



Above are shown the massive proportions of Primo Carnera who is 6 ft. 7 in. tall and weighs 283 lbs. At the right is shown to what heights his seconds must aspire to help him dress.

The shoes and boxing gloves of the Man Mountain measure 19 inches in length.

ALTHOUGH the boxing ability of Primo Carnera is being hotly debated in many quarters, there is no denying the fact that he is the most colorful of the present day gladiators — and the biggest.

Primo can get nothing ready-made to fit him. Not even the boxing rules. The rules state that a boxer must use six-ounce gloves, but six ounces of leather would not cover Primo's enormous fists; so the rules had to be altered to fit him, with the result that his gloves are nearly a pound overweight.

Defying DEATH in a

Scotty demonstrates the approved way of leaping from the trailing edge of a plane wing, diving toward the tail as the plane flies at 80 m. p. h.

Credited with 275 official parachute jumps, W. F. Scott, familiarly known as "Scotty," holder of the Navy record jump of 15,200 feet, tells here of some particularly close calls in which he brushed elbows with the Grim Reaper. Scotty is jumping again now after a two months' enforced vacation caused by an automobile accident, after which his life was despaired of — ironic testimony to the relative safety of air and land travel!

FOR sheer thrills none of my experiences during ten years of parachute jumping can compare with those of the summer and fall of 1928. On July Fourth I made a successful jump on Lake Keuka, near Hammondsport, N. Y., but the wind caught my 'chute and entangled the harness so that I was dragged through the water with my head partially submerged, for two miles. On August 15 I dropped on a Washington apartment house in the heart of the city after encountering six different cross winds, was barely able to catch the ledge of the building top, couldn't quite reach the fire escape just below, and had to hang suspended for several minutes before three policemen came to the rescue. Only five

Here Scotty is awaiting rescue while hanging suspended from the roof of an apartment building after a thrilling drop. 'Chute is caught on ledge.

PARACHUTE

by **W. F. SCOTT**
Champion Parachute Jumper of the Navy

The most thrilling moment of a parachute drop—the instant before the big parasol opens. The pilot 'chute can be seen pulling the silk from its pack a moment after the rip cord was pulled.

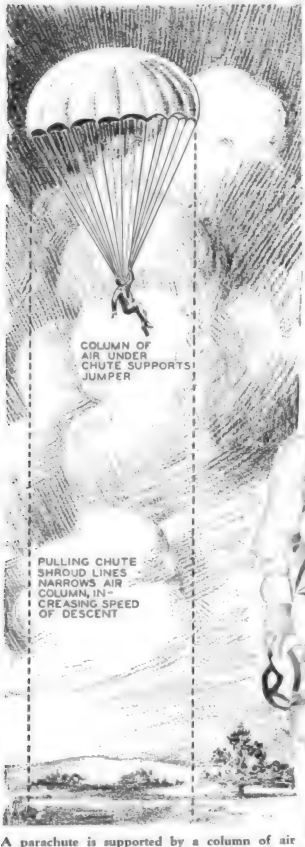
days later I landed full tilt on a group of high tension wires of 35,000 voltage, on the edge of Bolling Field, Washington.

That July Fourth experience was a terrific battle with death. Never will I forget it, for only by a miracle am I now alive to describe it. My purpose in going to Hammondsport was not only to make an exhibition jump but to make an official test of a new type of rubber suit designed to save the lives of aviators who are forced to resort to their 'chute over a body of water.

Now, I'm barely five feet tall, yet this suit was made for a man who measures five feet eight. However, I was sealed in the contraption, which was all in one piece, including the stockings. Sealed in is right. The front of the suit was laced up with heavy thumbscrews against rubber gaskets. Rubber bands were placed around my wrists and adhesive tape bound around my neck mighty tight. So tight, in fact, that when I jumped I thought I was going to choke when the wind struck me full force.

The plane was an O-L-8, a new amphibian. With Lieut. Harvey Bowes at the controls we sailed out, 9 miles from Ithaca, into the center of beautiful Lake Keuka, which is 5 miles wide, 22 miles long and at least a couple of miles at its deepest point. The jump from 4,000 feet was satisfactory enough, but when the 'chute snapped open, about 1200 feet below my leap, an enormous hole ripped open along the back of the rubber suit, due, no doubt, to the shock of the wind against the heavy harness around my body.

However, everything else seemed to be all right until I hit the water. Always, of course, a jumper aims to disengage the parachute from his body as soon as he lands. This I attempted to do, but I was so



A parachute is supported by a column of air directly beneath it. By pulling the shroud lines, the jumper decreases the width of the column and consequently speeds up the rate of descent; at the same time the parachute moves sidewise in the direction the lines are pulled. Scotty is shown in inset.

badly entangled that I failed. Meanwhile the wind and water were waging a fierce struggle for supremacy over what was to be my fate, the water pouring into the gaping hole in the rubber suit, thereby tending to pull me beneath the surface, and the wind spasmodically catching hold of the 'chute and forcing it along the water at a fast rate of speed.

Bear in mind also that the rubber suit itself weighed about 20 pounds dry, with five additional pounds of lead in the sole of each shoe, presumably for the purpose of maintaining my body in an upright position at all times while in the water.

Pretty soon the suit acted just like a giant bucket of water attached to my person, dragging my head beneath the surface every now and again. And now a sudden gust of wind caught the 'chute, just as Captain H. C. Richardson, in charge of the test, noticed my plight and headed for me in his speed boat from a point perhaps 200 yards away. Whereupon for over two miles I was in a helpless, and apparently hopeless, situation. Inextricably entangled in the harness, which was still strapped to my body, I was hurtled, at dizzy speed, through the water, occasionally rolling over the surface, but more often with my nose exposed to a six-inch covering of water.

For perhaps half of that terrible ride I was fully conscious, able to observe almost everything that was going on, but utterly unable to help myself. Then all went blank. However, Captain Richardson told me afterwards that my face had been completely submerged for six minutes before he and his assistants were able to drag me out. Even then my face had turned blue in color. But quickly they took me

"First time" jumpers usually prefer the pull-off method of leaping, as shown above, in which the jumper pulls the rip cord while standing on the end of the wing, and is pulled off when 'chute opens.

to the nearest dock, offered first aid for almost an hour, shot a stomach pump into me and let me lie down for a spell. Only Captain Richardson's rare presence of mind and speed of action saved my life, combined with the fact that the rescue party was able to locate me, thanks to the fact that the parachute and harness were able to float on the surface, thereby rendering them visible to the rescue party for hundreds of yards.

A good idea of the buoyancy of a parachute is given in this picture, in which a man has crawled over the top of a big 'chute.

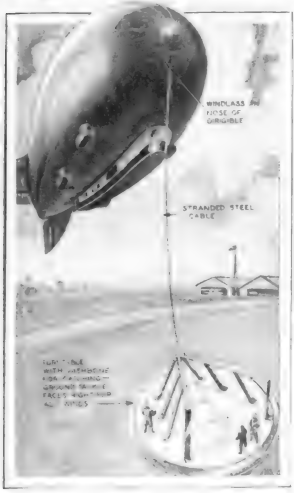
My experience of August 20, 1923, was easily the second most thrilling of a lifetime. A big movie company that makes news reels wanted to take some pictures of myself and three other Navy men jumping simultaneously from a plane over Bolling Field, Washington. The film was to be called the "race to earth," but it might well have been termed "the race with death." I won the pictorial race handily enough, but almost lost my life during the venture.

From a 1500 foot elevation we all jumped from a Navy Ford transport. Once my 'chute was open and I was speeding towards the earth, I took careful note of a spot on the field where I wanted to land, but a strong wind blew up suddenly and upset my plans. Imagine my horror to realize, when only a couple hundred feet from the ground, that I was likely to drop full tilt on a group of high tension wires of 35,000 voltage, near the roof of a hangar!

Unfortunately, however, it was too late for me to accomplish much towards guiding the 'chute, so within a few seconds I found myself suspended on one of those dangerous wires like a canary on a perch. True enough, the wires were barely six feet from the ground, but since I measure only five

(Continued on page 188)

Huge "Wishbone" Anchor Simplifies Landing of Dirigible



The dirigible cuts the motors, lowers the ground cable and drifts back until the cable catches.

Dandelions Hoard Food Supply

LIKE nearly all living plants, dandelions get their chief food supply from their own leaves, which supply is stopped when the green leaves are cut off.

The roots of the dandelion plant, some of which are usually left in the ground whenever the visible parts of the plant are dug out by the gardener, contain food materials for just such emergencies. So soon as the leaves are cut off the surviving roots draw on this reserve food supply and send up new leaves.

It is for this reason that dandelions reappear in the lawn a short time after having been dug out. The only way to eventually rid the turf of this weed is to go over the lawn repeatedly, digging out the new plants before the leaves have had a fair chance to begin the process of renewing the food supply in the roots.

ONE of the principal drawbacks to the extensive use of lighter-than-air craft has been the necessity for maintaining an excessively large ground crew for handling the ship upon landing. While mooring masts have proved quite successful they have also proved to be quite expensive, while a large ground crew is still required.

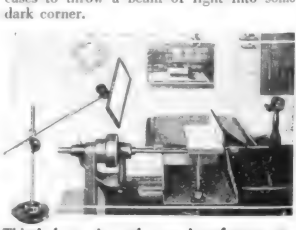
The "wishbone" anchor shown on the left is designed to simplify these matters, as with it, one or two men on the ground will be able to secure the dirigible.

The device consists of a turntable which may be rotated by one man, or which may be automatically pointed into the wind by being hooked up electrically with a wind vane. A steel "V", with the point facing into the wind, is placed on the turntable in such a manner that the ground cable released from the nose of the dirigible catches in the point of the "wishbone" and moors the ship securely.

Mirrors in the Shop Speed Work

THE use of a mirror is not always an indication of vanity. It has a definite place in modern shop equipment and proves its right to that place in many ways. For instance, when using a circular saw attachment on the lathe, the table is necessarily much higher than would be the case with a regular machine for the same purpose, and it is quite difficult to see the point at which the saw enters the work. A mirror placed at some convenient point opposite and behind the lathe shows a good view of just what is going to happen.

A small mirror mounted on an adjustable stand is convenient on many jobs, not only to "see around corners" but in some cases to throw a beam of light into some dark corner.



This is how mirror shows point of saw entry. The insert shows an adjustable shop mirror.

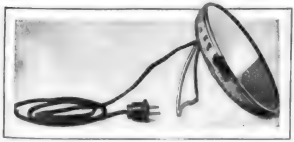
Outboard Motor Dredges Piles From Lake After Storm

As the stream loosened the piles they were salvaged by men on the raft.

Hypodermic Makes Meat Juicy

DOCTOR GAUDUCHEAU, an eminent French physician, claims to have discovered a process for making large, juicy steaks from the meat of undernourished animals. The process consists of injecting salt water, oil of garlic, cooking cognac and oil of nuts into the meat with a hypodermic needle over a period of several days.

A Mirror With Internal Light



The electric bulb concentrates light on the face.

THIS toilet and shaving mirror, recently invented in Germany, is equipped with an internal electric bulb which concentrates the light on the user's face. It is portable and may be plugged into any light socket.

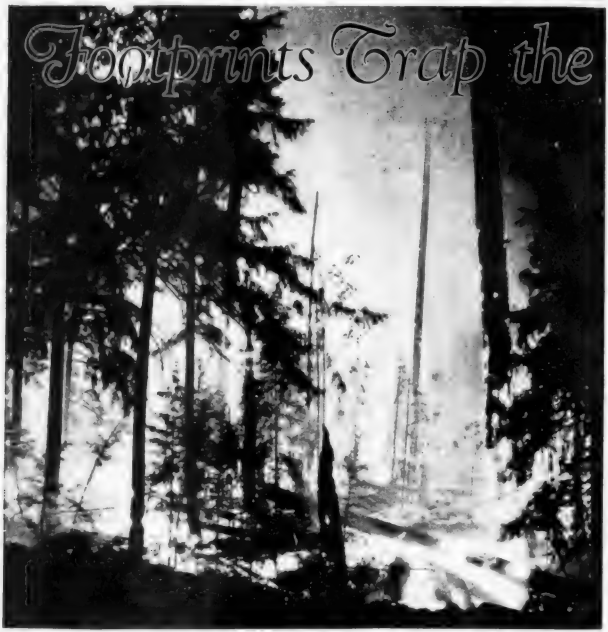
AN OUTBOARD motor designed for pleasure outings became a work horse recently and helped to repair the ravages committed by Lake Michigan during the late storms. The pounding of the waves reduced the wooden breakwater at Waukegan, Illinois, to kindling. When the storm subsided the naked piling was left standing, unsightly and useless before the factory doors.

Engineers commandeered an outboard motor capable of producing about 10 horse power and used this boat power engine to remove the piling. Attached to a centrifugal pump, the motor threw a stream of water at high pressure for more than fifty feet.

A raft, the power head mounted in a boat, a length of hose and iron pipe completed the equipment used by the crew of men to remove about twenty of the piling. The pipe was thrust into the bottom of the lake alongside the piling, and the thrust of the water at high pressure loosened the huge poles.

The force developed by this power head is believed to have opened new avenues of uses for this type of motors. Hydraulic mining and other work requiring a stream of water under high pressure will be new fields of endeavor.

Footprints Trap the



Plaster footprint casts now help to convict arsonists who set forest fires like the one in this photo.

AS MUCH as thirty years ago forestry officials realized that footprints were usually an important clue to the identity of persons who cause forest fires. Footprints about the scene of a forest fire origin were often the means of accomplishing the arrest of a suspect, but they were seldom conclusive evidence for obtaining his conviction in court.

Today, however, persons who start forest fires by criminal carelessness, or deliberate criminal intent, run an infinitely greater risk of going to prison than they ever have in the past. The detection of forest fire origins has become a highly developed science. Science has eliminated much of the guesswork from forest firebug identification. Forest detectives have learned what clues to look for, and how to interpret them when such clues are found. One of the strongest links in the forging of such chains of evidence is a method of recording footprints so that footprint evidence is now almost the same clue to the identification of the person who starts a forest fire as fingerprints are to a police identification bureau.

As a means of putting teeth into footprint evidence, private detectives employed in the forest lands of a large western lumber company, took a lesson from specialists

Forest Firebug

by John Edwin Hogg

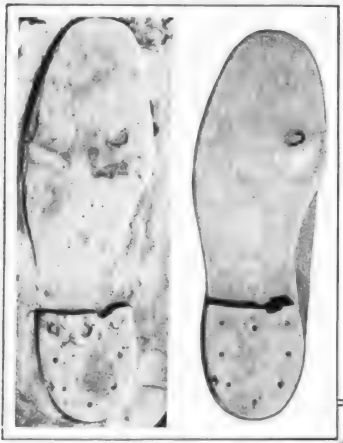
Footprints, almost as infallible as fingerprints, help convict firebugs who destroy forests, through a plaster cast system of recording shoe prints found at the scene of the crime.

Making firebugs who set forest fires help to extinguish them is one measure of punishment inflicted. Note the thick smoke haze.

of natural history. They adopted the method of taking plaster cast records of human footprints, which has been used for many years in natural history science for recording the footprints of dinosaurs, and other prehistoric animals.

To record such footprints, a very thin mixture of plaster of Paris and water is poured into the impression found on the ground. The plaster hardens in a few minutes, and may then be picked up in the form of a durable, negative replica of the imprint. In natural history work these negative records are re-cast to obtain a final specimen in the form of a positive. But for forest detective work the plaster records are taken in negative form only. The negative plaster cast of a footprint impression in soft earth, clay or sand, becomes practically a duplicate image of the footwear worn by the suspected forest criminal. Skillful work permits the recording of forest footprints with such a degree of accuracy that a good footprint is almost the equivalent of the name and address of the person who starts a forest fire.

Obviously, the best footprint records are taken from those that occur in soft earth, mud, clay, or damp sand. For a long time after this method came into use footprints in dry sand were next to worthless. The forest detectives, however, refused to give up anything offering even a partial solution to the identification of those who start forest fires. So, after a great deal of experimenting, they found that footprints in dry sand could be carefully sprayed with fine oil from an atomizer, binding the sand together to make highly accurate footprint records possible in plaster.

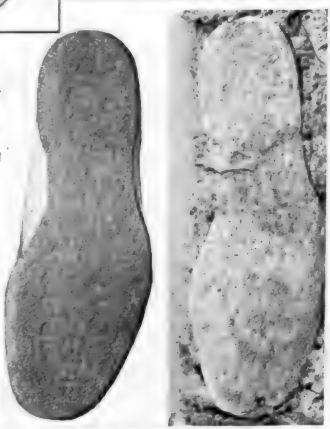


Plaster cast of a footprint left in wet mud, at left, is an almost perfect reproduction of the sole that left the print, shown at right.

The deduction of evidence from footprint records has become an art and a science with those guardians of the forests who now apply it for the protection of our all-important forest resources. Through years of study these men have learned that it is almost impossible to find any two pairs of boots or shoes that will leave identical imprints upon the ground. Two pairs of shoes, of the same size and shape, produced by the same manufacturer, would leave imprints that would be exactly alike to the average person. But let the footprint expert examine two such similar footprint records and he will quickly note many differences. The slightest wear discernible on the two pairs of shoes will not occur in the same places on identical shoes worn by two different persons. Careful measuring and calipering will quickly reveal the difference. Moreover, it has been learned that even the first few steps in a new pair of shoes will brand them with certain tell-tale marks easily distinguished by the forest detective who studies the plaster record of the imprint made by such a shoe. Give him the record of any footprint, and he'll compare it with any number of shoes to find the one with which the imprint was made.

Now, let us see how these footprint records are actually applied in the detection of forest fire origins. Some convicted forest firebugs who are now doing time in prison might tell a better story. "They'd know better next time."

Some months ago a fire trap was discovered in a western forest. By rare good fortune a timber cruiser found it several hours before an alarm clock contraption, hooked up with a battery and spark plug, would have started a destructive forest fire. It took the forest detectives only a few hours to gather the following evidence from around the scene of the fire trap:



Sponge rubber shoe sole, at left, with plaster impression taken from sand, at right. Oil is sprayed on the sand containing the print to solidify it for the plaster.

Dog's Footprint With Missing Toe Convicts Master of Forest Arson

The culprit who had attempted this dastardly deed was a man about six feet tall and weighing around 200 or 220 pounds.

He was wearing leather boots with rubber heels.

These boots were fairly well worn.

There was a hole in the sole of his right boot near the middle of the ball of the foot.

The rubber heels were worn and run over.

The left boot bore a mark near the toe that

Forest fires such as this are often set by firebugs who want the land cleared so that they can use it as pasturage for cattle herds.

Dotted line indicates missing portion of a dog's toe, preserved in a cast of his footprint, which helped convict his firebug master.

was apparently the result of being stubbed upon a nail.

The man was wearing corduroy trousers that flapped loosely outside his boots. (Indicated by marks in mud and sand.)

All of the foregoing evidence was obtained from footprint records.

Evidence deduced from other sources was as follows:

The man was wearing a gray sweater.

He chewed tobacco of a well-known plug twist brand.

With this evidence at hand, fourteen men who were known to have been in the forest at approximately the time the fire trap was set, were detained upon suspicion. One by one these suspects were eliminated, and the fourteenth man openly accused of the crime. Confronted with evidence that spelled his conviction in court, the offender pleaded guilty, and is now in prison.

This was a very simple and easy conviction of a forest firebug. The primary identification of the culprit was by the fact that his footprints matched his boots so perfectly that he might as well have left his name and address on the fire trap. The fact that he wore a gray sweater was gleaned from a little wisp of wool that had been snagged off in the brush. He had left various samples of the kind of tobacco he chewed while setting the fire trap. Only one tobacconist in a neighboring village sold that kind of tobacco, and he furnished the names of the men to whom he habitually sold it. Fingerprints on the fire trap told part of the story, and the alarm clock was traced to the manufacturer—then to a local jeweler, who testified that he'd sold it to the man accused of attempting to set the forest on fire. The

(Continued on page 204)

CIRCLES World on MOTORCYCLE

Lieut. Kralichek-Soboleff and his globe-circling motorcycle.

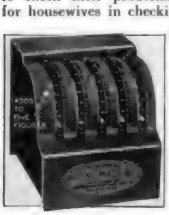
LIEUTENANT I. S. Kralichek-Soboleff, former member of the Russian "White Army," and at present representing the Russian Y.M.C.A. of Shanghai, China, is now nearing the completion of his most unusual feat of traveling around the world on a motorcycle. During his travels, which started a year and a half ago, he has passed through eighteen countries and has covered 32,000 miles. He recently arrived in California, from where he will make his way back to China to complete his trip.

Mud Doesn't Stick to This Shovel

A PNEUMATIC shovel has been invented by Thomas A. O'Neil of Clifton, Arizona, which is so designed that it prevents ores, concentrates, and other sticky material from clinging to the edge and surface. The shovel is so constructed that a stream of compressed air can be delivered from the forward edge, breaking up the clinging material so that it may be readily handled.

An Inexpensive Adding Machine

THIS small adding machine, which is cheap enough to be within the means of all, is made especially for school children to check their problems in addition and for housewives in checking their household accounts. It is also said to be accurate enough for storekeepers or professional men in totaling invoices, statements, etc.



The machine will add any set of figures that do not exceed a total of 99,999.

Making Your Own Coil Springs

WITH a hand drill, pliers and a quantity of piano wire you can turn out coil springs of innumerable sizes and degrees of strength.

Clamp the drill in a vise, with the chuck up and select a drill bit, rod or section of pipe of the approximate inside diameter of the spring to be made. Clamp the end of the wire in the chuck together with the bit, and wind it around the form by turning the drill handle, guiding the wire with one hand. It may be necessary to bend the end of the wire at right angles to make it hold in the chuck. Most springs will unwind slightly when released, so you should use a form somewhat smaller than the inside measurement.

This is the way to set up the hand drill for making your own coil springs.

Rubber Cap and Mask Protects Swimmer's Eyes and Ears

OCCASIONAL swimmers sometimes find that water in the eyes and ears becomes annoying. As a protection from this inconvenience a rubber cap with an attached mask has been devised which keeps water from eyes and ears as well as keeping the hair dry. The mask is fitted with small glass goggles and may be turned up when not in use.

The new mask is already popular on the California beaches. Here is Leila Hyams, motion picture star, displaying one of the many styles.

Self-Adjusting Shock Absorber

EVER since the coming of the automobile, engineering brains have been concerned with controlling spring action. Heretofore all of these devices have been limited in their capacity, as sufficient resistance to control excessive spring action has resulted in a sacrifice of center freedom.

This problem now seems to be solved by the new Hydro-Cushion which employs a variable by-pass which automatically keeps the center of weight in true relation to the automobile springs no matter what load is carried. It is claimed by the manufacturers that this shock absorber will entirely eliminate bottoming, pitching, throwing and sidesway. The device is procurable for all makes of cars.

Cut-away view of double cylinder hydro-cushion. The cylinder on the left is for checking sidesway and rebound while the one on the right is the compression cylinder. Figures 1-7 indicate the silencer, 2-8 the pressure piston, 3-11 the pin valves, 4-9 the check valves, 5-10 the orifices, and 6 the compensator. Oil furnishes resistance.

Copper and Brass Easily Tinned

BRASS and copper are easily tinned if first boiled with tin filings in a solution of caustic alkali or cream of tartar.

One Tire — Two Water Dishes

WHAT the poultry raiser wants for young chicks is plenty of water but placed so that there is no danger of drowning. An old auto casing will make two just such watering dishes of shallow depth, easy access and ample supply.

All you have to do is run a knife around the casing through the tread midway between the beads. The photo shows one-half of such a tire in use. Of course, the casing that is well worn will be best since it will cut more easily. Half a tire will hold enough water to last twenty chicks all day.

Tire provides plenty of water with no danger.

Denmark's Amazing SUBMARINE Plane

The Danish Navy recently secretly tested a successful plane which not only flies, but which can fold its wings and travel undersea—a perfect submarine!

AT LAST the flying submarine has been invented. This hybrid craft which has already undergone successful tests off the Danish coast, will travel over land, run down a beach and launch itself into the sea, and then it is able to turn itself into a submarine and continue to travel underwater. This important military invention, developed by the Danish Navy, can then rise to the surface, unfold its telescopic wings and fly away from the scene of operations.

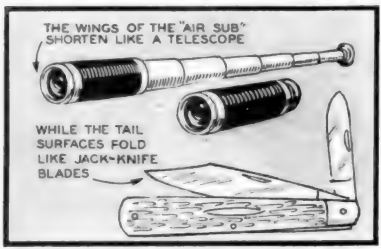
The four-element craft has a tapering metal hull resembling the well known Dornier flying boat hulls—in fact it is rumored that the invention is the work of the Dornier factory—and on each side are the folding metal wings which are telescoped when not in use. This telescoping is done by a worm gear mechanism within the hull of the strange craft. Floats and wheels undercarriged on the wing stubs perform their functions when called upon to make water or field landings.

Afloat, after closing the water-tight compartments of the ship, the crews can submerge her and operate her like a submarine by flooding the tanks provided for the purpose. The submarine characteristics of the craft are further enhanced by the folding of the tail surfaces of the airplane, which function is performed after the manner of the pocket knives known to every small boy. The stabilizer and vertical fins fold into the hull like knife blades, the blades of the propellers are removed by a special quick-demounting device, a periscope is run up, and presto! The airplane is ready to dive!

Sounds like a real Jules Verne dream, doesn't it? Yet the device is an actuality. Pictures in the form of photographs are not available for obvious military reasons, but a representative of MODERN MECHANICS has drawn the ship from information gained by close contact with reliable sources.

As a submarine, the craft is propelled by a small gasoline engine, exhausting and taking in fresh air from the periscope tubes when the craft is running under the surface—immune from gunfire and of such extremely low visibility that it is highly effective as a scout. The vessel can be further submerged, but cannot then be operated by the power of a propeller.

When submerged, pumps are manually operated. Small battery-plant is carried for the lighting of the ship. The crew comprises five men.



The wings of the Danish Navy's triple-threat plane fold like the elements of a telescope when it is desired to submerge. The tail surfaces fold into the hull like knife blades.

Exact details as to the armament carried are not available, though logic would indicate that aerial bombs would be the most easily carried and the most destructive weapons possible. Light torpedoes are carried, however.

Among the interesting accessories of the machine are a combined wheel skid and rudder, removable railing, retractable wheels.

The fact that such a plane is now actually built and operated is no less amazing to present day folk than was the announcement of Simon Lake's first successful undersea trip.

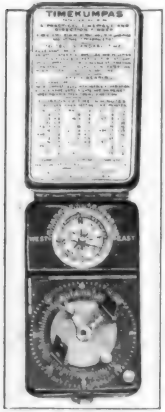
Amazing in the daringness of conception, and expected to be far reaching in strategical value from a military standpoint is the remarkable new submarine-amphibion airplane secretly tested by Denmark.

"Movie-of-U" Makes Film for Screen Test in Six Minutes

With this new "Movie-of-U" the aspirant sits in booth while a self-operating and developing camera makes movie photos in six minutes.

ALL those aspiring to fame as movie stars can save themselves the costly trip to Hollywood for a try-out by using the newly invented "Movie-of-U" device shown in the photo at the left. The chief feature of the machine is a self-operating and developing camera. The aspirant enters the booth, inserts a quarter in the slot, presses the button that sets the electrically powered camera in motion, and proceeds to act. In six minutes after she has finished, the film is developed and is projected on the screen above the head for inspection.

Pocket Kit for Guiding Woodsmen



OUTDOOR sportsmen who like to wander footloose around in the woods will find the new "tele-compass," shown in the photo at the left, an invaluable addition to their hiking equipment. The instrument comprises an accurate compass, a sun dial, and a range finder, all of which are contained in a small folding pocket kit that occupies very little space. It will be hard to get lost with this device at hand, which is the invention of Geo. Hollinwood.

A Talking Grandfather's Clock

A GRANDFATHER clock that has gone modern with a vengeance, which chimes and talks the hours, reminds you that it is eight o'clock — time to go to school, picks up broadcast music, plays the latest record hits—which in fact seems to have everything but a soul, has recently been built by Joseph Pinto. The clock contains the usual clock machinery, a loud speaker, a radio receiving set, phonograph and records.

This clock "talks" hours, reminds you of duties, and plays radio and phonograph music.

New Golf Practice Court Retrieves Balls Automatically

CHASING golf balls on practice courts needs no longer be the nuisance it usually is if the invention recently perfected by a Seaside, Oregon, druggist is installed in the courts throughout the country. Where in the old type of practice court the player had to go out and pick up his golf balls and place them on the tee, the new court performs the same acts automatically, so that all the player has to do is swat away till he gets tired.

Golf ball returns by gravity and compressed air plunger to tee.

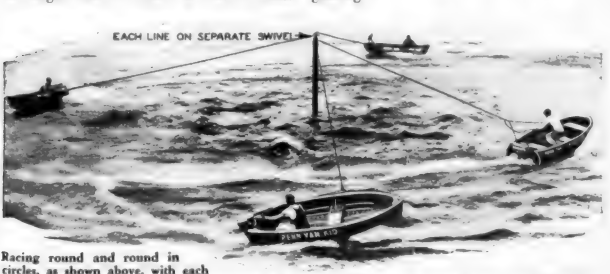
The new court has a flooring which slants from the backstop towards the tee. The ball strikes the canvas backstop, drops to the floor and rolls back via the groove to a compartment beneath the tee platform. When the player has driven a ball, he presses down a foot pedal in front of him. The tee descends and a lever operates a control which admits one golf ball from the compartment to the tee. The speed of the return may be regulated by adjusting the compressed air valve.

Talkies Teach Medical Students

TALKIES were recently put to use at the Northwestern University Medical School in Chicago to record by sight and sound the procedure of a major operation, voice instruction accompanying the visual demonstration.

Motor Boat Sportsmen Race Over Merry-Go-Round Course for Thrill

SPEEDING at 40 miles per hour in an outboard motorboat around a merry-go-round course is one of the thrill-producers of water sportsmen at Winterhaven, Florida. Each boat is attached to a rope of a different length from the others so that the boats can pass each other on the course. They circle round and round the central pole held by the ropes. The only difficulty in this sport is that you never get anywhere—you just keep on going and end at the beginning.



Racing round and round in circles, as shown above, with each boat attached to a line from the center post, is proving thrilling sport among motor boat enthusiasts.

TRICKS of the

This remarkable photograph, taken by a cameraman concealed in a nearby tower, shows Detroit rum runners landing liquor at a dock on the Detroit river. The rum runners are unloading a speedboat, being held by man with rope at right, while his companions are transferring the liquor to a car. The second car is used to convoy the liquor through town.

A Chicago bootlegger recently remarked that there was at least one honest official in that town—Pat Roche, chief investigator for the State's Attorney—who couldn't be "fixed." For eight years Roche was a special agent for the treasury on the trail of crooked dry agents. He tells here the inside story of the rum runners, and why they flourish.

IN TWO weeks' time a few years ago, on the strength of a set of credentials purporting to show that I was a prohibition agent, I had $85,000 in bribes handed me as my share of the money being paid a small ring of dry agents in New York.

"Important money," as the gangsters call thousand dollar bills when handed out in fist-fuls, can be had at any time, usually without even the asking, by any official of the prohibition or customs services. Less important money can be had by any of untold thousands of policemen, sheriffs, deputies, highway patrolmen, state policemen, township constables and politicians—everybody, in fact, who comes in contact with the vast business of transporting and selling liquor.

Is it any wonder that enough of them fall for the graft to make the liquor business a fairly safe gamble? Most of the men who can make anywhere from $100 to $100,000 by turning the head or being in the wrong place at the right time are earning in the neighborhood of $50 to $75 a week.

I was never a bona fide prohibition agent, but for eight years I was a special agent of the treasury department working, chiefly, to trap crooked dry agents. To do that we usually had to trap the bootleggers and rum runners with whom they dealt, so I saw

Rum Runners

by PAT ROCHE
Former Special Agent U. S. Treasury

A favorite trick of rum runners is to store their cargo in a gas tank. Note all the bottles taken from one tank.

plenty of the inside of the rum game.

If you draw a line around the United States, about 250 to 300 miles back from the border, you have marked off the chief rum running territory. In the vast hinterland the local moonshiner, the cheating druggist, the home brew maker, and the peddler of poisonous extracts and concoctions is the chief source of supply for intoxicants.

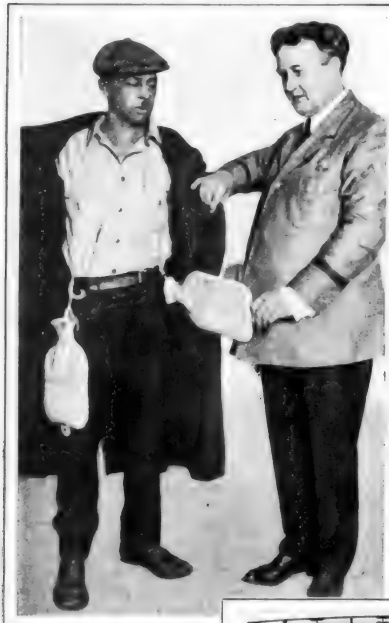
But within a night's automobile ride of the rum ships along the coast, the export docks of Canada—which are now going out of business—and the Mexican border is the habitat of the rum runner and the big time bootlegger.

It costs, or has cost while the export docks along the Detroit river flourished, about $20 to grease the way for a case of liquor to reach Chicago. Five dollars went to the boatman who ferried the case across the river; $5 to the guard who let it slip past the border, and $10 smoothed the way through Michigan and Indiana into Chicago.

A case of standard brands of Scotch, in 40 ounce, imperial quarts, commission wrapped—that is, bearing the seals and wrapping of the Quebec Liquor Commission—costs $65 in Canada. Add $20 for graft, and the cost of running the liquor down by automobile, 20 cases to a load, and the case costs about $87, delivered in Chicago. The market price is around $125 to $135, depending on the supply.

But you can buy commission wrapped Scotch in Chicago for $55 to $65 a case! The answer is cutting plants, fake labels, fake stamps, and fake wrapping. The Quebec Liquor Commission has a special wrapping paper, with red, blue and green threads woven into it, just like the American treasury notes. But we have seized vast quantities of counterfeit paper that couldn't be told from the genuine if we didn't know the liquor commission controlled all the genuine supply.

The cutting plant buys large quantities of genuine liquor from the runners, opens the bottles, and adds an equal part of alcohol and an equal part of water, making three cases out of one. Flavoring and coloring matter also are added to bring the taste and appearance up to the original. Bottles, either purchased new from glass



A unique method of liquor transportation via hot water bottles. The culprit was captured by a detective curious as to why the negro gurgled when he walked.

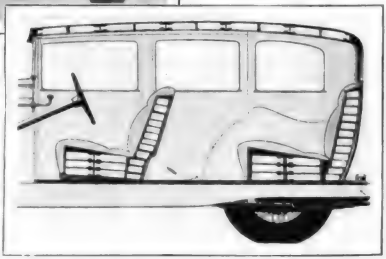
plants which make them to order and duplicate any foreign product in shape, size and appearance, or bought from old bottle dealers who have built up a market for empties, are used. The finished product can not be told from the original.

If the alcohol used in cutting is pure grain, the product itself is no more harmful than the original pure liquor. If it is re-cooked denatured alcohol its harmfulness depends on the skill of the cooker and the state of his equipment. Nobody can remove the government formula denaturants completely, for their evaporation point is too near that of pure alcohol, and some is bound to pass over with the alcohol vapor to be condensed.

An expert cooker can produce a product that is virtually harmless, but so few of them are expert, and, working in dirty basement hideaways, with dirty equipment, they actually cook into the product poisons that were not there before.

Low grade alcohol, produced from corn sugar or other sources, is also largely used in faking real liquor. There again the dirt and poisons from insanitary equipment are the chief source of danger.

Counterfeit American brands have virtually disappeared, and with them has disappeared the counterfeiting of internal revenue strip stamps on a large scale. A certain



240 quarts of whisky can be concealed in the body of a five-passenger sedan without leaving a suspicious trace. Drawing shows how cars are made with contraband compartments.

X-Ray Pierces Hay Bales to Uncover Concealed Shipment of Whisky

Science comes to the aid of dry agents in detecting liquor shipments. Here we have government agents uncovering whisky shipped inside bales of hay, using a portable X-ray. The man at the left is holding a fluoroscope, looking through a bale, while the agent at right operates the X-ray machine.

amount is still made, and only yesterday 17 men, including 11 from Chicago and three from New York, two from Milwaukee and one from Rock Island, were sentenced in a Chicago federal court for that crime.

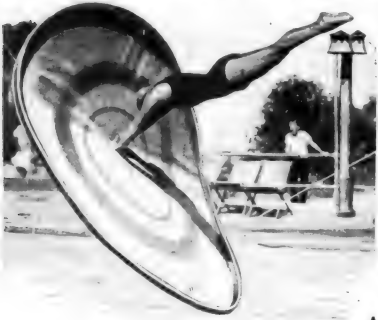
I broke up one of the biggest counterfeiting rings in history here in Chicago a few years ago and for a time put fake strip stamps off the market.

The tricks by which liquor is slipped past the borders and moved to the nearby cities are legion. It's a pretty safe bet, though, that tricks alone don't move one case in 100. Somewhere along the route graft must be paid.

Automobiles are largely used to bring liquor into Chicago. Standard sedans are turned over to expert body builders who specialize in building hidden compartments. A standard five passenger sedan can be altered to hide twenty cases of 12 bottles each, without any of the secret compartments being visible, even under close scrutiny. That's 240 quarts, and it seems almost impossible to hide that many bottles in the backs of the seats, the sides and the roof of a car without causing undue bulging, but it is being done right along.

The tricks along the sea coast are equally unique. Just the other day a fishing boat came into New York, apparently with a solid concrete ballast in the hold. Dry agents who ripped out the concrete found it was only a thin floor, with a fortune in liquor under it. Some liquor, after it reaches this country, is shipped by rail as freight in large lots, or as express in small quantities. The usual express dodge is to pack six bottles in a tin can, solder it tight, so if one is broken it can't leak, and pack two tins to a box. The shipper has labels printed purporting to show he is a dealer in radio parts, printing plates, or some similar product that would be shipped in boxes of about that size and weight. The buyer pays cash in advance. If the shipment is detected and confiscated by government agents, it is the buyer who loses his money.

Water Sportsmen Dive Bull's-eyes Through Paper Target

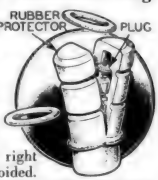


Johnny Riley, national diving champ, is here scoring a hit in California's latest water sport.

SCORING bull's-eyes by diving headlong into huge paper targets is the latest diversion in water sports to be introduced among water-minded Californians. This unique pastime came into popularity recently during the preparations for annual spring tournament, in which Johnny Riley, national diving champion, shown scoring a perfect bull's-eye at the left, will be the chief contender.

Diving at the bull's-eye of the target teaches accuracy and form for water sportsmen, and is altogether harmless.

Rubber Case Saves Plugs



ALLOWING a spark plug to knock around in a tool kit often results in breakage. However, by enclosing it in the hollow rubber protector shown at the right the danger is avoided. The device is grooved for holding the rings which band the two rubber halves together.

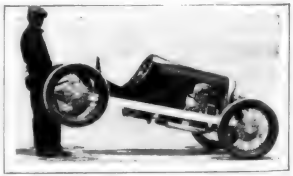
Exerciser Rights Faulty Posture

This device corrects faulty posture by exercising neck, shoulder and arm muscles.

BUSINESS men and women who by necessity must lead sedentary lives will find the exercising device shown at the left an excellent corrective for the stooping posture developed by such a manner of living. The device can be hung up in a doorway or in the attic for a few minutes exercise each day. Muscles of the shoulders, arms and neck are given a strenuous workout by the pulling movement of the arms and the stretching motion to the neck.

Lightest Racer Does 70 Per Hour

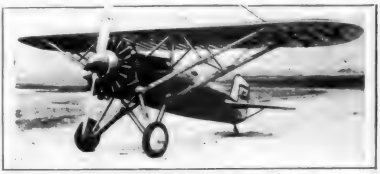
DAYTONA Beach has seen thousands of fast autos during the history of its race track career, but the smallest it has ever seen is the tiny Keeger, shown with its owner below, Fred Hapenauer. Although it weighs only 540 pounds, it can streak along at 70 miles per hour.



This 540-pound racing car, lightest at Daytona Beach, has a v-shaped motor of two cylinders.

First All Metal Parasol Type Fighting Plane for the U. S.

THE Boeing Airplane Company has developed the first all-metal parasol type combat plane which has recently been accepted by the United States Air Service. In a test flight this ship was flown from Seattle to Omaha at a cruising speed of 160 m.p.h. Although the high speed and climb are exceptional, this data is being withheld by the Army Intelligence Department. Machine guns are synchronized to fire through the propeller which spins at a rate of 2200 revolutions per minute. Bomb racks are carried under the fuselage. The ship is a single seater and is powered with a 450 horse-power supercharged Wasp motor.



Boeing fighter is powered with 425 horsepower Wasp motor.

Takes Photo on Untreated Metal

Metal records image projected in full daylight.

DOCTOR P. H. CARR has developed an appliance for photographing on untreated metal. The invention is based on the discovery that metals record impressions from streaks of electrons and that these marks may be developed in the photographic sense of the word.

Rubber Cravats Don't Wear Out

A PROPOSED new use for rubber, now much over-produced for the world's markets, and a new article of clothing have been created in France in the form of a rubber necktie. Sheets and threads of rubber or rubberized fabric are put together into either the conventional four-in-hand tie, into bows or other varieties. Colors can be provided to suit the wearer's taste. Surface finishes resemble either silk or other fabrics, or totally new effects of color and texture not obtainable with any necktie material now available can be created, the inventors claim, in the new rubber articles. The rubber ties do not fray at the edges or wear out. Breakfast egg and noon-day soup spots have no terrors for them.

Small Latch from Old Coil Parts

A LIGHT door latch can be quickly and easily made of old vibrator parts from a Ford coil box. The steel hammer strip is ripped off one bridge and the ends filed back a bit. The end of the round hammer is cut off and the spring bent and set firmly downwards. A latch bar is cut from an old barrel hoop just wide enough to slip under the bridges which are tacked down with heavy tacks. The hammer holds the latch bar tight.

Inexpensive latch is easy to make and set up.

LEARN to FLY

Donald McDonald, of Roswell, New Mexico, wins the eighth free flying course.

Second prize, a real flying helmet, goes to Sherman T. Clinger, of Kansas City.

While Richard K. James, of Fort Humphries, Va., walks off with the goggles for 3rd prize.

THE lucky man to win the eighth "Win Your Wings" contest is Donald McDonald, living at 513 North Missouri Street, Roswell, New Mexico.

Did we say "Lucky"? Well, perhaps we don't do justice to the eighteen-year-old lad who submitted the prize-winning letter. Donald adhered strictly to the rules of the contest. His entry blank was complete, a photo was enclosed, the letter was mailed on time and was the acme of neatness.

But most important of all—this bonnie laddie from the "*hie'lans*" of New Mexico really had something to say and knew exactly how to say it. If Donald flies as well as he writes he'll be an ace in no time.

Sherman T. Clinger, who resides at the Y.M.C.A. in Kansas City, Missouri, was declared winner of the second prize because of his originality in submitting his entry in the form of a home-made phonograph record. Mr. Clinger took us so by surprise by sending in the record that some of the judges almost let the originality of presentation over-ride the excellent subject matter in the letter which eventually was awarded first prize. The debate concerning the relative merits of these two entries got so hot that the "Big Boss" had to be called in to break the dead-lock.

Richard K. James, of Fort Humphries, Virginia, was awarded third prize—a pair of real flying goggles—after another hot argument among the judges. Nearly thirty other letters were almost on par with that of Mr. James. If these contests get any hotter they'll have to be taken into the ice-box to be judged.

But Mr. James well merits his victory. He is one of the regular entrants in the "Win Your Wings" contests, and his entries have always shown enough class to receive consideration. In two previous contests he has barely been nosed out for third prize. A little more care with your answers, Dick, and you'll win a free flying course yet. In the meantime, these goggles will come in handy on these long motorcycle trips you

WE PAY the WAY

were telling us about last month.

But to get back to our first-prize winner. At the time this is being written Donald McDonald is awaiting word from the Department of Commerce on the outcome of his physical examination. If he successfully passes it he will receive his training at "The Air University of America," the Braley School of Flying at Wichita, Kansas. This is the same school as Bob Dumas, the winner of Contest Number 2, attended. Further information about the Braley school will be found on the following page.

Flying fans will be interested to learn that Bob Ringle, the winner of Contest Number 5, has completed his course at the Von Hoffmann School at St. Louis, and has come through with flying colors. Bob likes the school so well that he is staying right on there until he gets in enough hours to obtain his pilot's license. That's the spirit, Bob.

And now for Flying Contest Number Twelve. There'll be only one more contest after this one, so let's hear from all of you flying fans! Six questions are hidden in the advertising section of this issue of MODERN MECHANICS. All you have to do is to find these questions, write out your answers to the best of your ability, clip and fill in the entry blank at the bottom of this page and mail them to us. Don't forget to enclose a photograph of yourself.

For the best set of answers, as determined by the contest judges, a free flying course at some reputable aviation school will be awarded. MODERN MECHANICS will pay the full tuition, railroad fare both ways, room and board and some incidental expenses such as the purchase of goggles and helmet.

For the second best set of answers a real, honest to goodness flying helmet will be the prize, while third prize will be a pair of genuine aviator's goggles.

You may be next! The fact that you may have won a minor prize in a previous contest does not bar you from trying for the big prize. Get your shears and clip the entry blank, sign on the dotted line, and —Let's Go!

WIN YOUR WINGS!

Rules of the Contest

For the best answers to the six questions that can be found in the advertising section in the back of this issue, as determined by the contest judges, MODERN MECHANICS will award a complete flying course in some recognized flying school, paying all expenses of tuition, living costs, railroad fares and for some needed equipment in the form of helmet and goggles. Neatness, originality and adequacy of answers will be the guiding factors of the judges in determining the winner. Second and third prizes will be awarded as announced elsewhere on this page. It is not necessary to be a yearly subscriber to the magazine.

Anyone may compete who is 16 years of age or over, and a resident of the United States or Canada. Members of the staff of this magazine are, of course, not eligible to enter. Address your letters to Flying Contest No. 12, Modern Mechanics Magazine, 501 Seventh Avenue South, Minneapolis, Minn. Entries must be postmarked not later than September 15, 1930, to be eligible for this contest. Clip or copy the entry blank below and attach it to your letter. Fill in the information requested. Include a snap shot of yourself, if possible—a big photo isn't needed; just a kodak print.

It is not necessary to buy a copy of the magazine to compete. In case of a tie, duplicate prizes will be awarded. Fill in the entry blank, answer the questions and send in your entry now. Don't forget to include your photo!

Entry Blank

My name is .....

Address ..... City ..... State .....

Age ..... Height ..... Weight ..... Sex .....

If under 21, please answer the question below:

Will your parents consent to your learning to fly? Parent's signature .....

Attach your answers to the questions, and your photo, to this blank. Mail it before September 15, 1930, to

FLYING CONTEST NO. 12
MODERN MECHANICS MAGAZINE
501 SEVENTH AVE. S., MINNEAPOLIS, MINN.

Braley School Trains Winner

Above is shown a portion of the large Braley Airport with part of its equipment. At the right, a Travel Air instruction ship.

THE Braley School of Flying, Inc., known as the "Air University of America," has been selected as the well-equipped flying school which will train Donald McDonald, the winner of "Win Your Wings" Contest Number Eight.

We send McDonald to the Braley School with complete confidence, knowing that the training he will receive here will be safe and thorough and that he will leave after completing his course completely satisfied that MODERN MECHANICS has lived up to its promise and has really given him an opportunity to learn to fly.

There are but few flying schools in America approaching the size and completeness of the Braley School. Not only is it especially well equipped materially, but it also has a consistently high class personnel of instructors and maintenance men. General Manager J. V. C. Gregory is himself a transport pilot of long experience.

Another member of the executive staff, E. E. Crumplar, is also a transport pilot and was once a member of Eddie Rickenbacker's "Hat in the Ring" unit of war-time fame. O. P. Harrah, an army trained pilot, has been with the school as operations manager almost since its beginning nearly three years ago. He has an enviable record as a safe pilot, having never had an accident. All flying instructors are transport pilots of long experience and have passed the Department of Commerce tests as qualified instructors.

The school airport, one of the best in the world devoted exclusively to a training school, comprises 320 acres of level prairie. This airport is ideally situated for student training. It is within a mile of the municipal airport and the big tri-motored lines fly over it daily. Adjoining it on the west is the new Cessna airplane factory while a tract on the east is used by another aircraft company. The Swift and Sullivan and the new Knoll factories are within three miles of the school, while the new Travel Air factory is within sight of the field.

The ground school, known as one of the most systematic in the country, is in charge of Fred Snavely, who was trained at Brooks Field in the thorough army method and is putting this thoroughness in the Braley School curriculum. Every ground school instructor holds a government license provided for his particular department.

The school has a maintenance department which works independently of the ground school, insuring that all planes are cared for by competent mechanics. A welding department, and a meteorology and navigation department is also part of the school.

Many Queer Gadgets Found on Burnelli's New Airplane

FREAK planes are nothing new, but a ship of unconventional design that really flies is a distinct novelty. This new type of Brunelli plane, recently flown at the Newark Airport by Roger Wolfe Kahn, not only flies but seems to be nearly foolproof. Large biplane ailerons not only give easy control but additional lift.

This plane looks like a mechanic's nightmare—but it flies.

The World's Largest Saxophone

THERE is plenty of music in this horn. Standing six feet, seven inches in height, this saxophone is believed to be the largest in the world. In spite of its height it may be played from a sitting position—provided the musician is sufficiently expert.

A tripod support is needed for this saxophone.

Senses of Blind Not More Acute

THE popular idea that blind persons develop especially delicate senses of hearing and touch to compensate in part for loss of sight is exploded by Professor Pierre Villey, of the University of Caen, France, in summarizing recent psychological and physiological tests.

There exists, Professor Villey states, tests which determine the least amount of sound which a person can hear or the least pressure on the skin which can be felt. When these minimum sounds and skin pressures are measured for blind persons as compared with normal individuals no consistent differences are found. Accordingly, the French expert concludes, a blind person neither hears nor feels any more delicately or precisely than a normal individual.

What does happen is that the blind person may acquire unusual ability to discriminate between sensations derived from sound or touch and to interpret these sensations correctly. A musician who is able to see, Professor Villey points out, nevertheless acquires abnormal ability to distinguish small differences in musical tones. A bank clerk acquires unusual ability in identifying counterfeit money either by touch or by sight. A botanist will distinguish leaves or an entomologist insects which seem to ordinary people to be exactly alike.

Just so the Caen professor believes, blind persons pay more attention to the messages of touch and hearing than normal persons.

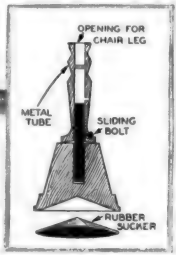
Illuminated Dog to Lead Blind

A BERLIN blind man has invented an illuminated dog so that he and other blind individuals may be led out for walks at night as well as in the daytime. Dogs are now trained in Europe and are being introduced into the United States to guide blind people.

Mechanical AIDS HELP

Have you ever marveled at the cleverness exhibited by jugglers and other stage performers? They're clever, true enough—but mechanical aids help them put across their mystifying tricks.

This juggling stunt is clever enough, but not so difficult as it looks. The diagram at the right shows how the inverted flower pot is held in place by a rubber sucker, while the candlestick which holds the chair leg is secured to the pot by a hidden sliding bolt.



A CLEVER magician produces a girl from thin air; a skillful juggler balances precariously on the rear leg of a chair; a wonder marksman shatters a ball on top of a girl's head. It is all very wonderful, very mysterious, seemingly impossible. The furrowed brows of a legion of spectators voice the question:

"How do they do it?"

And the answer, like the answer to a vast array of other questions, is quite simple. Take, for example, that classic of mystery wherein the magician exhibits a tri-fold screen, wheels it around, opens it up—absolutely empty! And yet, a moment later the screen is again opened and a pretty girl smiles graciously at a bewildered audience.

The "how" is absurdly simple. The center panel of the screen is made of cloth, and this is broken in the center, two strips of overlapping elastic concealing the edges of the vertical cut. The girl is inside the screen when it is first rolled onto the stage, this transition made possible by means of concealed rollers in the legs of the screen. So . . . the screen, closed, is wheeled around and shown on all sides. Immediately the exterior view is finished, the girl quietly slips through the opening in the screen and goes to the back where she stands on a slight platform built on the lower edge. The screen is then opened and the interior shown. As soon as the screen is closed, the girl comes back through the cut panel to the interior, where she carefully adjusts a gracious smile with which to greet her audience. It's as simple as all that!

A miracle man who deceives the public quite disgracefully is the juggler. In one of his pet effects, he places a flower pot on top of a table. On top of the flower pot he places a candlestick, and in the mouth of the candlestick he places the right rear leg of an ordinary kitchen chair. Up on this precarious perch our hero goes, and there he smilingly balances himself, at the same time showering or cascading three or more balls in his hands.

It looks like a skilful piece of work, and it is, too, but in a sense radically different from the audience's viewpoint. The skill is found in the ingenious mechanical arrangement of the properties used. The diagram above shows how the metal flower pot is held to the table by means of a rubber

the Stage Illusionist—

by SAM BROWN

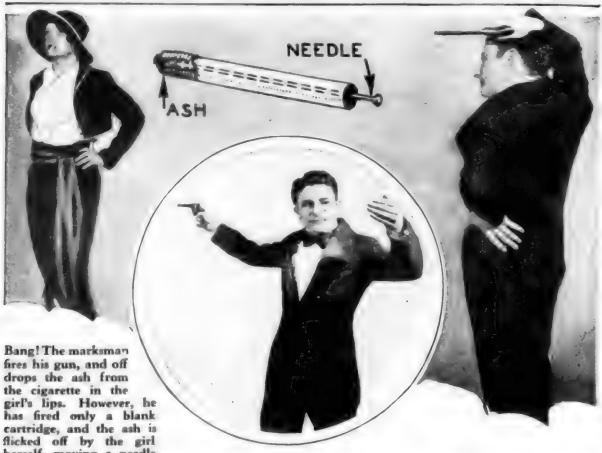
How has this young lady appeared within the folds of the screen when only a moment before the performers had unfolded it and shown it to be empty? The answer is a slit down the center of the screen through which the girl stepped unseen when the two side panels were closed.

sucker. It shows how a sliding iron bolt slips down into a metal tube in the flower pot. It shows how the chair leg is slightly bent in order to fit into the recess in the top of the candlestick. Naturally enough, the performer can well afford to smile and exercise his little skill in juggling three balls when he knows that everything below him is as strong as the rock of Gibraltar.

Other wonders of the stage miracle men are equally simple. There is that little trick of the stage marksman which calls for the extinguishing of a cigarette held in the mouth of an assistant. It is very realistic. You see the red, glowing tip of the cigarette; you see the marksman draw up in position to shoot . . . And then—Bang! the gun is fired, and the cigarette glow is gone, apparently shot away by the bullet.

The audience imagine they have looked upon great skill. What really happens is something entirely different. In the first place, the gun is loaded with nothing more nor less than blank cartridges. The second part of the illusion has to do with the cigarette, which is cleverly prepared, as shown in the diagram, so that a sharp flick on the part of the assistant's tongue sends the long needle darting forward and the ash is knocked from the cigarette tip. Properly timed, the illusion is perfect.

Stage sharpshooters, of course, cannot very well put on a whole program using nothing but blank cartridges. Occasionally they fire an actual bullet. Such is the case in the William Tell effect in which a



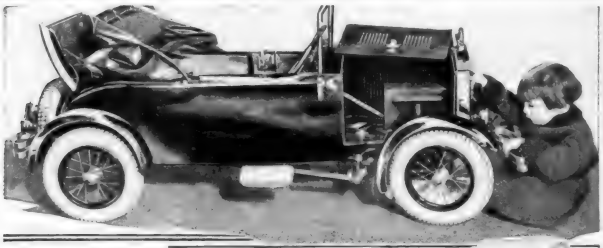
Bang! The marksman fires his gun, and off drops the ash from the cigarette in the girl's lips. However, he has fired only a blank cartridge, and the ash is flicked off by the girl herself, moving a needle in the cigarette with her tongue. The insert shows same stunt done with a mirror for aiming.

ball is shattered as it reposes on the head of a fair assistant. The *modus operandi* differs somewhat. Although a real bullet is used, it never touches the ball. Instead, the modern William Tell aims at a large metal disk which is concealed behind the curtain before which the assistant is standing. This disk is attached to one end of a short rod which is pivoted in the center, the other end housing a sharp spike which swings through a slit cut in the curtain. When the sharpshooter fires, he takes care to strike the curtain about twelve inches above the head of the girl. The bullet will then hit the metal disk, which is padded to prevent ringing, and the spike will be shot forward through the slit in the curtain. The ball, which is a composite one of resin and chalk and very brittle, is shattered by the spike which immediately returns to its place of concealment behind the curtain. The lever is used in many other effects in stage sharpshooting. By the use of this principle, a bullet can be shot through a wedding ring and still break one or more balls. Many performers use a dummy in these effects, the lever being concealed in the dummy's chest, and so arranged that by hitting it the shooter can knock articles from the dummy's head or hands.

Mental telepathy, for which the public has had quite a flair in the past few years, employs many artifices. One of the simplest of these acts requires the medium to be securely blindfolded, a committee from the audience seeing to this part of the program. Nevertheless, she calls out the name and describes minutely any small object which her partner may receive on his tour through the audience. The effect, of course, depends upon the assistant concealed in the wings. He is equipped with a powerful field glass or telescope with which he views, through a slit in the curtain, the various items held up by the performer. The information is then relayed to the medium by means of a headphone set, with wires running under the stage covering, and the act goes along quite merrily.

And so it goes—the most mystifying illusions of stage magicians are only the work of clever mechanics.

SOMETHING NEW on WHEELS



Two-passenger toy auto, worked by foot power, has electric lights, horn.

THERE'S more than one way of getting there, in fact, almost every day brings us something new in the way of transportation. Here we have a child's two-passenger electric lighted foot power car, the storage battery under the hood supply-the juice.

This unique "poor man's car" is propelled the same as an ordinary bicycle.

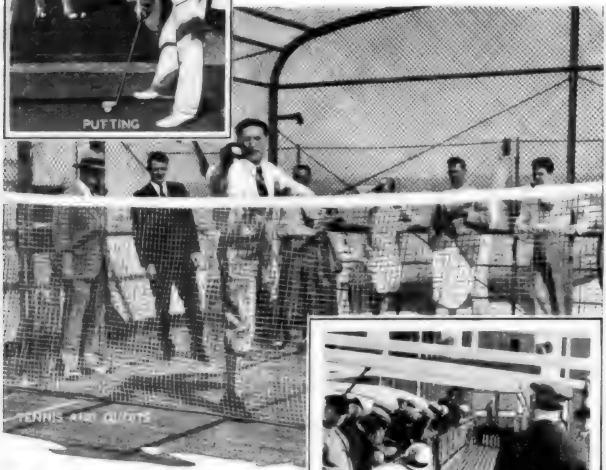
Double-decked trailer shown above has a capacity of six automobiles.

Double-decked auto transport trailers that can carry six automobiles are now being made by a Detroit company. Cars occupying the upper tier are loaded first and raised to a riding position one at a time on an elevated track powered by the motor truck. Although the truck and trailer is sixty feet in length, it is able to negotiate even short turns without interfering with traffic.

The Pedaluxe, which recently made its appearance in Europe, is a three-wheeled foot power affair with a detachable side car.

FLOATING *Playgrounds*

No longer must bored travelers pace the pitching decks or remain curled up in a chair while the tedious hours of the ocean voyage slip slowly by. Every deck on the modern liner is now a fully equipped playground, designed to keep the traveler fit and contented.



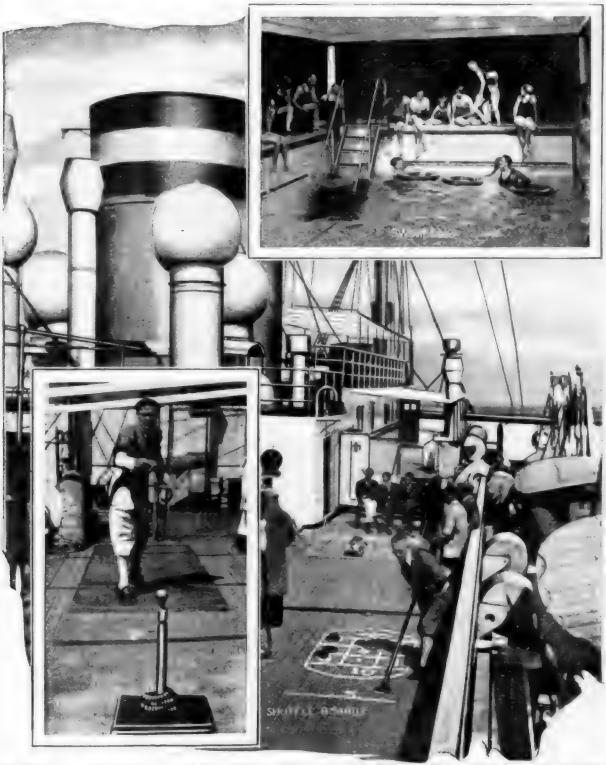
Above are shown the deck putting greens where that elusive touch may be maintained. Full-size tennis courts are also available at sea.

The promenade deck fenced off for bowling.

PERHAPS the most potent reason for the increasing popularity of sea-travel is the extraordinary lengths to which the larger steamship lines have gone to keep the passengers amused and contented.

The very latest addition to the sea-going playground is the regulation tennis court, completely enclosed with wire netting, which has recently been installed on the boat deck of the Hamburg-American liner *New York*. When not being used for the racket game, the court makes an excellent quoits court, the net stretched waist high adding a han-

Keep Ocean Travelers Fit

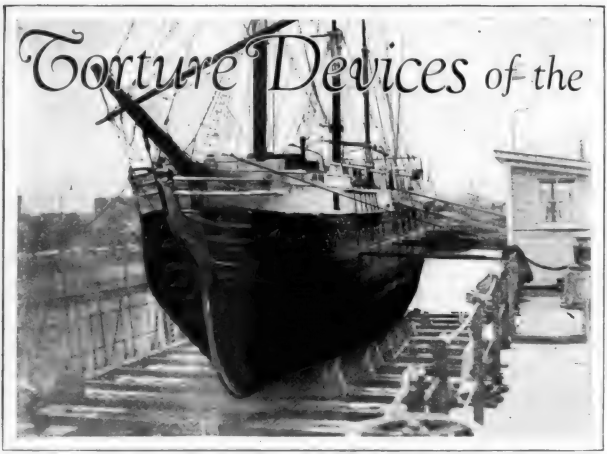


Shuffle-board and quoits, two of the older pastimes aboard ship, are still popular; but only in later years have the liners been equipped with luxurious swimming pools.

dicap which calls for more skill than the ordinary deck quoits.

The smooth hard-wood surfaces of the promenade deck are now being fenced off for bowling and duck pins, while the boat deck is equipped with areas for quoits and shuffle-board. Below decks may be found luxurious swimming pools.

Torture Devices of the



The excellent physical condition of the ship "Success" is due to her construction of Burmese teak

Methods of torture used to punish convicts, in vogue in the last century, are graphically displayed aboard the old prison ship, "Success," used in the 1850's to transport British convicts to Australia. The ship is now touring various American ports.

WHEN the jails of England overflowed with prisoners nearly 130 years ago, Great Britain sought to relieve the situation by chartering a fleet of convict ships to transport the "criminals" to Australia. For fifty years this practice was continued, until public revulsion against the inhumanities to which the prisoners on these ships were subjected caused its abandonment.

At that time there were more than 145 offenses for which the decreed penalty was death, but the hangmen were kept so busy that for the less heinous crimes the sentence of death was commuted to one of transportation for life, or where the crime was exceptionally trivial, in the light of the present day—as, for example, the theft of a twopenny pie or a square of bleached linen—to a sentence of seven years, which was the minimum for a transported convict.

The convict ship *Success*, once more off the ways on her last American cruise, gives mute testimony of how not to solve the problem of more jails or less criminals. For forty years now, this ship, built in the year 1790, has sailed the seven seas as an exhibition in aid of prison reform. Aboard it may be seen the torture irons that broke men physically and mentally; the airless cells that rivalled the black hole of Calcutta; the branding irons which placed the ineradicable mark of the convict on prisoners.

Apart from its horrors of torture chambers, its "coffin" bath in which the wounds of lashed prisoners were swabbed with sea water, its flogging frames, its leg irons, and its punishment balls, the ship is a marvel of shipbuilding craft. Massively built of solid Burmese teak, the *Success* was first launched in 1790 as an armed East India merchantman with brass guns, and fitted

Old Convict Ships

by C. MORAN

handsomely for the reception aboard of princes, nabobs, and the wealthy traders of the Orient.

Her tonnage is 1100, and she is 135 feet long with 30 feet beam. Her solid sides are 2 feet 6 inches thick at the bilge, and her keelson is a solid teak baulk of great thickness, with sister keelsons little less massive. Her square cut stern and quarter galleries stamp her with the hallmark of antiquity, but her bluff bows show that she could never have distinguished herself for a high rate of speed.

The ship was chartered by the British Government in 1802 as

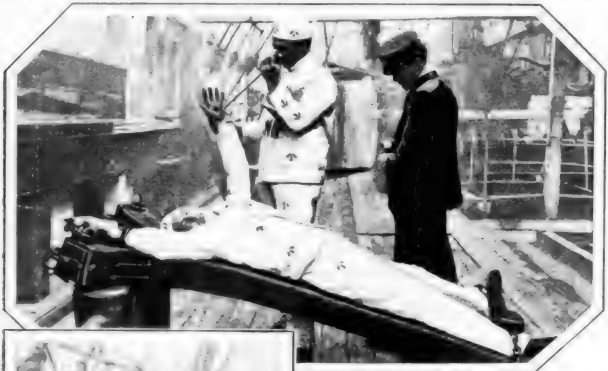
The "coffin bath" in which prisoners were placed after being flogged, where their wounds were splashed with salt water. The tub is lead lined.

one of a fleet of five convict ships to transport prisoners to Australia. Cells were constructed on the 'tween and lower decks, and a large force of warders was employed to guard the prisoners. "Refractory" prisoners were immured in dungeons in the dark depths of the lower deck, their only exercise being restricted to one hour in every twenty-four, when they were marched from stem to stern upon the upper deck. The course they followed can still be perceived by tracing the grooved pathway worn into the original planks of the deck.

The iron maiden, relic of medieval times, had spiked doors which closed on the luckless convict imprisoned within. The one shown above, from the "Success," is one of two now in existence. It was one of the most dreaded forms of torture, inflicted only on the most refractory convicts.

When a prisoner broke for freedom, and was captured, he was compelled to wear a heavy ball of iron, weighing 72 pounds, attached to his belt by a chain. The eyes of refractories on parade were sometimes

Sign of Arrow Branded on Palm Marked Prisoner Forever as a Convict



Before the days of fingerprint systems, prisoners were branded with hot irons. An arrow in the palm of the hand marked them as penal property.

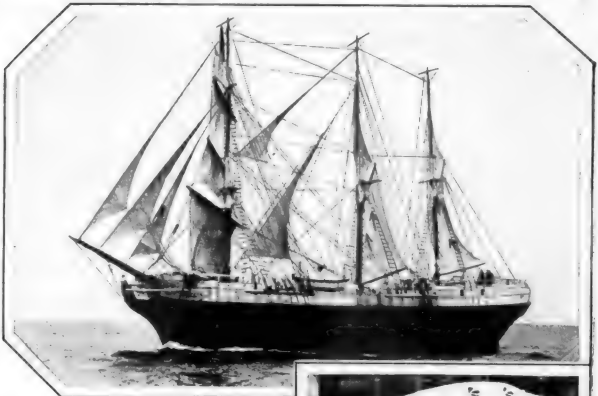
The original armor worn by Ned Kelly, leader of Australia's most notorious gang of bush-rangers (convicts who took to the bush as bandits) is one of the exhibits on the old ship.

tightly bandaged, and a "black gag" was used to silence their cries of pain, the gag consisting of a wooden bit in a leather bridle, the straps buckling around the convict's head and neck. The blacksmith's forge was under the fo'c'sle head, where the iron anklets and chains weighing from 7 pounds to 56 pounds were forged.

The corner cells on either side of the lower deck were the dreaded "black holes" in which prisoners who had been guilty of some breach of discipline or fractious conduct were punished by solitary confinement lasting from one to one hundred days, according to the gravity of the offense. These small and tapering torture-chambers measure only two feet eight inches across. The doors fit tight as valves and close with a swish, excluding all air except what can filter through a perforated iron plate over the bars above the door. A stout iron ring is fastened knee high in the shelving back of the cell and through this ring the right hand of the prisoner was passed, and then handcuffed to the left wrist. He was thus prevented from standing upright or lying down.

Constant applications of the "cat," imprisonment in the "black hole" and other

Convict Ship Used by Prison Reformers as Object Lesson in Cruelty



The "Success" leaving England en route for the United States, under her own sail. She made the trip in 96 days.

punishments were the instruments relied upon for producing a reform. In each of the larger cells, on either side of the corridor, the floor is worn into hollows and grooves, close against the doorway by the constant jangling and friction of the prisoners' leg-irons.

In 1851 the *Success* was permanently stationed as a receiving prison in Hobson's Bay, Australia, but in 1857 the disclosures that had been made of the inhuman treatment accorded the prisoners created an outcry in Australia that resulted in 1868 in the abandonment of the hulk system. For some years later the *Success* was used as a women's prison, then she became successively a reformatory ship and ammunition store, and later all the prison hulks were ordered to be sold on the express condition that they were to be broken up, and their associations lost to the recollection of the people of Australia.

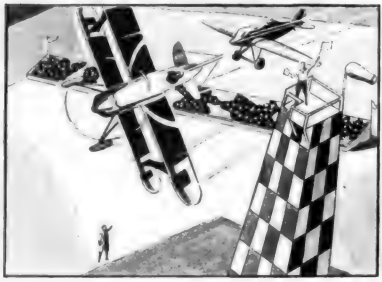
By a clerical error, this condition did not appear upon the terms of sale of the *Success*, hence she remains the only British convict ship afloat on the seven seas. In 1885 she was scuttled and sunk in Sydney harbor where she lay under the waters of

The crank iron turned prisoners into human question marks, holding them in this agonizing position for 2 to 24 hours.

Fort Jackson for five years. Then she was raised to be exhibited as an educational object lesson in prison reform. Since then the *Success* has been on exhibition in the

(Continued on page 202)

PLANE TALK



Edited by
MAJOR H. H. ARNOLD

Experience as a pilot dating back to the days of the Wright brothers, whose early planes he inspected for the government, qualifies Major Arnold admirably as editor of this monthly department. During the war he was assistant chief of the American Air Service.

Smoke Pots Are New Substitute for Airfield Wind Sock

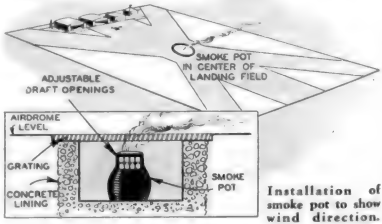
ONE of the first things a pilot does when he approaches a strange field is to look for the wind indicator. This is very important, for practically every maneuver which he makes with his plane from that time on until it stops rolling on the ground hinges on the direction of the wind. He flies the plane so that it heads into the wind, crosses the boundary obstacles at an altitude dependent upon the velocity of the wind and finally brings the plane down for a landing pointed directly into wind.

Although there is a general practice of placing wind cones on conspicuous elevated objects surrounding the airdrome, they are difficult to discern. The color of the cone may blend with the background, it may be hanging limp against the supporting pole, or it may be that the pilot looks for and expects to find the cone at a point far from that at which it actually is.

To secure all of the advantages of the wind cone and eliminate all of the disadvantages, smoke pots have been adopted at some of our most modern airports. The smoke pots are usually placed in the center of the landing circle, as that is the first part of the airdrome to attract the pilot's eye. He sees the circle and then the smoke streaming from the pots at the center. The smoke immediately tells the direction and velocity of the wind right at the point where he will bring his plane down.

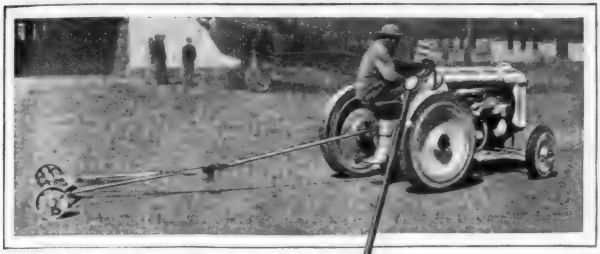
The smoke pots are placed in recesses in the ground and covered by a strong grating. The bars of the grating are sufficiently close together to permit the tail skids of planes to pass over without damage.

The pots burn crude oil and have such a capacity that they need be filled but once a day. The oil costs less than 35 cents a day. At night a small flood light beam illuminates the smoke so that it can be used as a wind indicator in the dark.



Installation of smoke pot to show wind direction.

Special Dolly Moves Airplanes Around Flying Fields

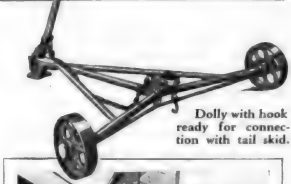


The dolly in traveling position, with the lifting hook at the end of the chain raised several inches above the ground.

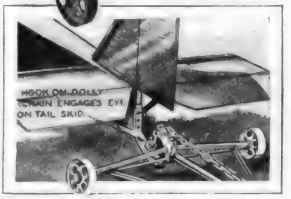
ONE of the most annoying problems of an airport is that of transporting planes from one hangar to another on the field. Airplanes are easy to handle and very graceful when in the air, but on the ground they are heavy, unwieldy pieces of equipment, and moving them about is an awkward problem at best. Some of the later types of planes have been equipped with tail wheels instead of skids, making their ground movements a comparatively simple matter, but the percentage of such ships is yet quite small, most of them clinging to the conventional skid. Accordingly, dollies must be provided in which the tails of planes can rest when being hauled about the field.

In the usual type of dolly it is necessary to lift the tail of the plane to a height of 18 inches to two feet. This requires the services of three or four men, for the tails of most airplanes to be transported in this fashion are very heavy. Accordingly, either men must be called from other work or a surplus of mechanics must always be available.

The photo above shows a new type of dolly which enables one man to raise the tail of an airplane, place it on the dolly and move the plane at will. When the handle of the dolly is in an upright position, a chain connected at its bottom is slack. This chain runs over a pulley and has a hook at its other end for attaching to the tail skid. When the handle is down, as when attached to a tractor for towing, the hook in the skid is lifted slightly and the plane's tail raised off the ground.



Dolly with hook ready for connection with tail skid.

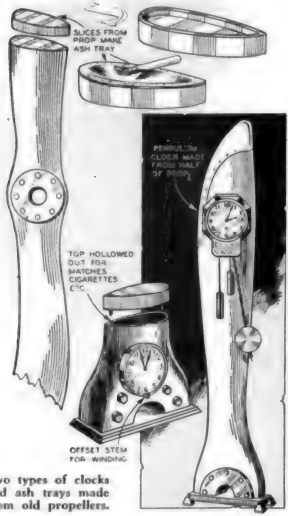


Showing how the hook of the dolly engages the tail skid, the chain moving forward over the pulley when the handle of the dolly is depressed.

Low Pressure Tires for Airplanes

A NEW tire for airplane landing gear which is mounted directly on the hub, taking the place of wheel spokes, is a late development proving popular on the newer planes. The tire, known as the Airwheel, is naturally very fat, and since it carries an increased volume of air it can support the same load as ordinary tires at materially lesser pressures. An enormous shock absorbing capacity is one result of the low pressures, which also helps to eliminate ground loops, and permits operation in sand.

Clocks, Ash Trays, Fans Can Be Made From Old Props



Two types of clocks and ash trays made from old propellers.

ON VISITS to aviation fields and airdromes, one sees many odd and useful things which have been made from old wooden propellers. There are many old propellers lying around every aviation field which can be used to make all sorts of useful articles.

The drawing above shows a wooden propeller with cuts made to secure parts for ash trays and a clock. The average prop is long enough to secure sufficient slices for about a dozen ash trays and still have the hub remaining for a clock.

To make the ash trays, take one of the cuts and hollow out the top with a sharp chisel. The rim should be about a quarter of an inch wide. The center of the top should be about three quarters of an inch deep. Although the wood used in the prop is hard, the top can be prepared with an ordinary wood chisel. The final operation is the fitting of a piece of sheet copper and hammering the copper so that it will conform to the cut out top. When the copper conforms, it is secured in place by a row of copper brads around the rim. The copper sheet is trimmed and all rough edges ground off. After the sides of the ash tray are given a coat of shellac, varnish or other covering, the ash tray is complete.

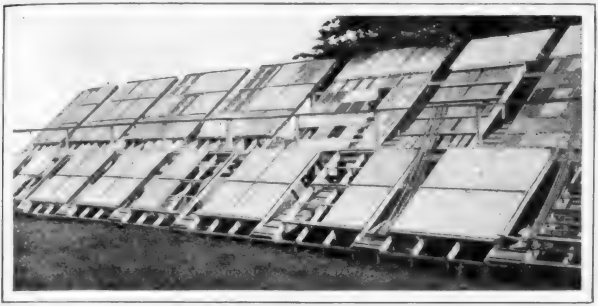
A very attractive clock can be made with the hub of the prop by cutting off the blades a short distance from either side of the hub. Select and fit any type of legs desired, to support the propeller section in a horizontal position. They can be long and set at an angle, or may be short and vertical. Secure an automobile clock and machine out the hub plate so that the clock will fit in the center. Nickel plate or give any other finish desired to hub plate and bolt heads. Varnish the wooden hub and legs. Insert the hub plate, bolts and clock in their proper places and the clock is finished.

Half props can also be used in making clocks. The drawing shows one in which the base was attached to the hub section. The hub plate was cut in half and, with the prop belts, nickeled. A pendulum clock was then fitted to the blade so that there was sufficient clearance for the weights to move up and down and for the pendulum to swing. Cuckoo clocks can be used, but more time is required in making as the recess in the blade must be larger.

In another type of construction the blade was made into a bridge lamp. The first operation was boring a hole from the tip, through the blade to the hub for the wire. Next the hub was fitted with a heavy base to make the lamp more difficult to overturn. After running the wire through the blade and installing the light fixtures and shade, the lamp is ready for its final coat of varnish or lacquer.

If lamp or clock are made from one-half of the prop, the other half may be used for ash trays, and in addition another clock. In this clock a recess must be cut in the hub for the clock. The propeller bolts are nickeled. The top of the hub may be left as is, or it may be hollowed out to provide compartments for cigarettes, matches, or other articles. In case the compartments are made in the top, studs should be provided to hold the top in place, as shown in the drawing. The figures herewith show offset winding stems for the clocks.

Airplane Dopes Tested on Frames Exposed to Weather



Each frame in the above picture contains "doped" airplane fabric exposed to the weather for test.

IT IS only in recent years that fabrics have been tested for strength before and after doping. Dope is applied to tighten the fabric and in addition to make the airplane surface impervious to air. Many studies have been made of dope to secure the best obtainable. It must give the fabric a smooth finish, make it impenetrable to air, be tough enough to withstand the pelting of rain and be durable enough to last for over a year.

In order to determine the effect of service conditions on different dopes, small panels of airplane cloth are used. Each panel is covered with one, two or more coats of dope. The panels are then placed on racks where they will be exposed to varying weather conditions.

The panels may stay on the rack for a year or more. During that period they are exposed to the rays of the summer's sun, the blizzards, sleet and snow of winter and the fogs, rain and winds of spring. When the test period is over, it is quite easy to pick out the fabric which has been treated in the manner best suited for airplanes. The tests thus show not only the best kind of dope but also the number of coats which should be used.

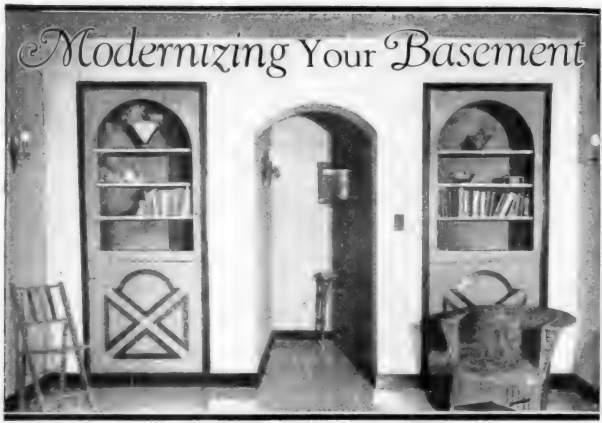
Vertical Slot Floodlights Take Glare Out of Pilot's Eyes When Landing

THE system of landing lights installed at the average airport makes it essential that planes land in one direction at night, regardless of wind direction. This is necessary on account of the beams from the flood lights, which blind aviators who endeavor to fly into the lights when landing.

Recently there has been developed a light which has none of these disadvantages. The beam is thrown out of the light through a vertical slot. This allows the light to cover a wide area horizontally but vertically the light band is limited by the height of the top of the slot. Above that there is no light or glare. Thus with the lights set a few feet above the ground, the aviator sitting in his plane is well above the blinding glare and can land directly into the beams.

Contrasting glare zones shown of two types of airfield lights.

Modernizing Your Basement



Who would believe that this was once the dingy entrance to an ordinary basement? The stairway leading from the first floor is concealed behind the arched doorway in the center foreground.

by **HELEN MARIE WALTER**

You can add an extra room to your home by fitting up the basement with building board walls and comfortable furniture. The cost is slight, considering the results, and the modernizing process is a simple one as explained in this article.

IN MID-SUMMER when the hot sun beats down on the outside playground it's a great comfort to have a cool retreat for the children. And in the winter when the thermometer hovers about and below the zero mark, and it's too cold for the children to brave the freezing winds, it's a pleasant thought to know that the children are having a rollicking time in a cozy playroom.

The problem of where to create this general utilities room is easily solved when one sees how really attractive the basement shown in the accompanying photographs has been made. Almost all the work was done by the home owners themselves. The room they had to work on was 14x26 feet in size and 8 feet high, with a small reception room at the base of the stairs. It in no way differed from the usual type of basement.

There is much to do to transform the basement, but there is great pleasure in doing it. First of all the foundation must be rendered water-proof. One excellent way is to paint the foundation with hot asphalt on the outside. Adding a little "water glass" to the concrete mortar will also make the walls quite water-proof. If the walls are already built and only dampness occurs, then a double coat of paint inside will usually help.

When the owners were quite sure that no dampness could invade the basement, they erected a framework of 2x4's spread one foot and four inches apart. Cane fiber board was then nailed to the framework as a foundation for plaster. The arrangement of the framework and the fiber board were so planned in this case as to obtain a novel design. The panels in the north wall were

Another view of the modernized basement. The windows are set in a false wall inside the actual basement wall, forming a shaft through which light filters from the real basement windows.

made by setting the studding on edge (4 inches thick) for the main portion and flatways, (2 inches thick) for the panels themselves. The idea, of course, can easily be varied in a place where different conditions prevail.

There is often some installation in a basement which is quite likely to detract greatly from the general effect if it is not carefully dressed up. A water meter, for instance, is usually set in a conspicuous place in the basement. An unusual stand or seat might be designed to fit over this in such a way that it would be completely hidden from view, but yet one could have easy access to the meter. The gay little seats built in the archways as shown in the pictures were originally planned just to cover the meter. A large pillar was erected to separate the seats, and a false wall was built about 14 inches out on either side to form a complete little arched alcove for the seats. The top of the seats are hinged on so that they can be easily lifted up. Besides concealing the meter, these box seats furnish sufficient store room for the children's toys.

A chance visit to a planing mill or to a site where a house is to be wrecked will be quite worth while to one who intends to dress up the basement. At the mill there are often odd pieces of framework or designs in wood lying about. These are often the incentive for a new-fashioned feature of the room. The distinctly new windows, for example, in the basement shown were obtained at the planing mill. The owner happened to see one of the casement frames and picked it up at a very low price. As his basement room had two windows, he ordered another frame built. The real basement windows were much too high for beauty, so a false wall was erected at the end of the basement where they appeared about ten inches from the original wall. The casement windows were then set in the new wall just below the original ones. The old wall was then covered with wall paper depicting outdoor scenery. The light comes down this shaft, brightens up the scenic background and filters through the curtains of lemon-colored net. Electric lights have been installed between the wall and window to give the appearance of light even at night and on dark days.

At this same planing mill some cupboard doors with a modernistic design carved in

This seat conceals a water meter. Toys are also stored beneath it.

them were found. A cupboard was accordingly built in either side of the entrance door. In harmony with the general scheme of the room, the tops of these cupboards are arched. Above are capacious book shelves which are open, and below, the doors cover more shelves for books and trinkets.

A trip to a house that was being razed was quite as profitable to this home owner, as had been the one to the planing mill. Here he picked up a little slate manteled fireplace which was ideal to place between the two windows. It cost him only five dollars to have put in because it was possible to use the chimney in common with the fireplace directly above it upstairs.

The color scheme carried out in the underground playroom should be one of warmth and beauty. The floor would be attractively covered with linoleum and kept well waxed, but in the case of this room the floor was smoothed down with a stone grinder and then painted with a deep cream-colored cement paint. This is most adaptable to waxing and provides a smooth floor. The walls and ceiling might be a warm cream or ivory. The color here was obtained by mixing the plaster with five pounds of ivory mineral color, giving it a rich appearance with a dull luster. Another coat of paint can be applied at any time.

In the planning of a color scheme for these downstairs rooms there is far greater play for originality than there is in the more formal upstairs. Here the bizarre and futuristic combinations are permissible and charming. A gallant array of colors against a grey background, or more subdued shades against walls of bronze with smartly patterned linoleum floors are ideas which may be worked out to proper advantage.

Close-up of one of the book-case alcoves. Venetian green with tangerine and black trim gives this alcove a striking appearance. Insert shows an appropriate style of electric light fixture for use on the walls. Several are used in the room.

National Forest CABIN SITES

This forest settlement has a total yearly rental of less than $100.

IF YOU have a secret "yen" for a snug log cabin beside a mountain stream or lake, just tell it to Uncle Sam. For a few dollars a year he'll gladly make your dreams of Paradise come true.

Under provisions of the forest law any citizen of the United States is entitled to building privileges in our national forests. Sites ranging from one to five acres may be leased upon request. For this privilege a nominal yearly rental, ranging from five to twenty-five dollars, is charged. Thirty years, however, is the longest period such a site can be enjoyed.

It is only necessary to write to the U. S. Forest Service, Washington, D. C.

This type of cabin may be built with the allowance of free logs.

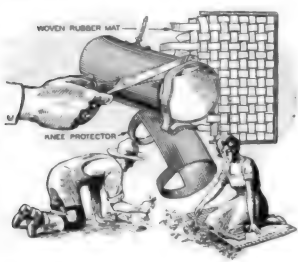
Uncle Sam will not permit the building of eye-sores in his forests. The type of cabin above has met with his approval.

HANDIKINKS

"Handikinks" are just what the name implies—handy little ideas which will save you time and money, or make some everyday job easier, or provide some simply built piece of equipment which will come in for daily use. You will be able to use the ideas on these pages to advantage.

Rubber Band Around Kettle Lid Speeds Cooking at High Altitudes

MOTOR tourists carrying portable cookstoves frequently experience difficulty in cooking foods in the mountains, owing to the lessened atmospheric pressure which reduces the temperature at which water boils. A familiar example of this is found in the fact that water boiling on Pike's Peak does not acquire sufficient heat to boil an egg. This condition can be remedied by sealing the lid of the cooking kettle with a wide rubber band, as shown in the drawing at the right. Steam generated by the boiling water is thus prevented from escaping and the pressure built up inside the kettle is increased, speeding up the cooking process. A suggestion which tourists have found valuable is that of pre-heating the campstove generator with a small chunk of canned heat, which is usually carried as part of the camp equipment. It yields a cleaner and hotter flame.—Dick Cole.



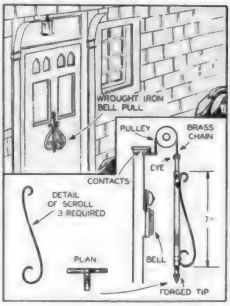
Garden Accessories from Old Tubes

A WOVEN rubber mat and a rubber knee protector, both useful garden accessories, can be made out of discarded inner tubes. For the mat, cut long strips of rubber about one inch wide from the tube, cutting it spirally. A number of these strips are then interwoven as shown at the left into a mat of any desired size. The knee protector is made from a section of tube about a foot long, from which a piece is removed as shown. This slips over the knees and protects them from stones and wet ground when kneeling.—Eugene Keyarts.

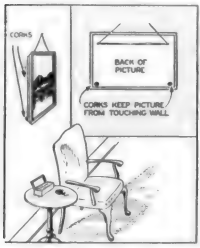
Ideas for the Household

Wrought Iron Electric Bell Pull for Door

THE usual round push button does not add much to the attractiveness of the ordinary door bell. A colonial style wrought iron bell pull, built after the style of the one at the right, will give a distinctive appearance to the door. The pull handle is of iron strips, made in accordance with the sketch. It is shaped from flat iron stock, available at any metal shop. Scrolls are easily bent with pliers. The chain is a simple copper one leading over a pulley to electric contacts, as indicated in the diagram. From the outside the bell pull has the appearance of operating a gong. The contacts consist of two metal buttons, the upper one stationary and the lower one movable in response to a pull from the chain.—G. A. Luers.

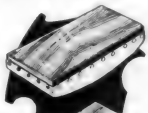


Cork Support for Picture Frames



EVERY picture in the house should be hung far enough away from the wall to prevent dirt and dust from settling behind it. This can be conveniently done by gluing a small cork on each of the lower corners of the picture. These hold the picture a short distance away from the wall so that there is no contact between the bottom of the frame and the wall paper. Thus, when the picture is taken down, there is no dirty streak to mark its bottom edge. The drawing at the left shows the arrangement.—Gordon Guy.

Quickly Made Shoe Shiner

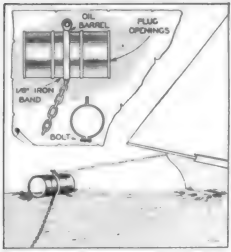


INSTEAD of searching for old cloths the next time you want to shine your shoes, take a few minutes to make yourself an efficient shiner like the one shown in the drawing at the right. Cut out a block of wood about 6 inches long, 2 inches wide, and three-quarters of an inch thick. Then from an old bath towel cut out half a dozen pieces size 2x6, and another piece half an inch all around. Place the smaller piece on the block and draw the covering taut, fastening it with tacks. A better grip can be obtained if the edges of the block are grooved.—Bud Collins.

Twisted Rice Paper Makes Excellent Pipe Cleaner

PIPE smokers in the Orient, particularly American and European residents, prefer pipe cleaners made of native rice paper to the manufactured article. These are made by twisting a strip of the paper about an inch wide into a tight cord, as shown at the left. The paper, being absorbent, cleans the pipe effectively when run through the stem. Tough tissue paper is a satisfactory substitute, and this type of cleaner is handy when none other is available in an emergency.—Floyd Orton.

Stunts for the Handy Man



Oil Barrel Makes Mooring Buoy for Boats

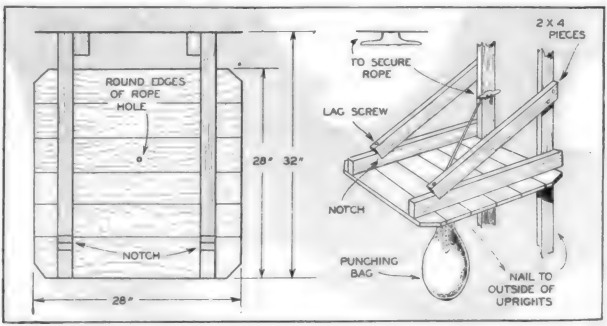
AN EMPTY steel drum of the type in which oil is usually sold makes an excellent mooring buoy for a boat. The anchor chain is attached to the oil barrel by means of an iron band which encircles it as shown in the drawing at the left. This strap is made in two half sections, bolted together at top and bottom after being twisted into shape to fit the barrel sides. The bottom end of the chain is anchored in a barrel filled with concrete, rocks, or any other type of anchor which is sufficiently heavy for the type of boat in question.—Gene Morley.

Razor Screw Driver

WHEN a safety razor is discarded, the knurled handle can be salvaged to make a small household screw driver by grinding off its end as shown in the drawing at the right. Often the metal of such a handle is too soft to make a tool that will withstand heavy usage. In this case the handle can be slotted to receive a small steel blade of the desired size, which is held firmly in place by soldering. The small size of the screwdriver makes it useful for close work.—Lester P. Young.

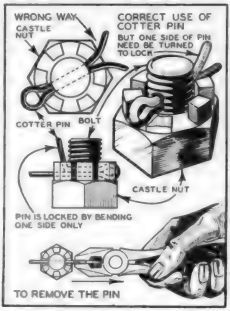
This Simple Punching Bag Platform Is Ideal for Installation in Garage

PUNCHING bags can be purchased cheaply, but platforms to hold them are somewhat expensive. The one shown below is cheaply constructed for installation in a garage, being mounted on the 2x4 uprights of the garage wall. Use nothing lighter than 2x4's for the platform frame, which can't be made too heavy. Use one-inch material for the striking surface. Attach these boards to the framework with flathead wood screws, countersunk. Sandpaper the edges of the rope hole to prevent chafing. Locate the platform just high enough on the wall to clear the top of your head.—Hi Sibley.



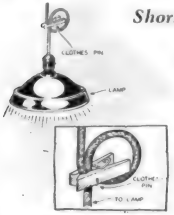
Workshop and Outdoor Kinks

Right Way to Fasten Cotter Pin in Lock Nut



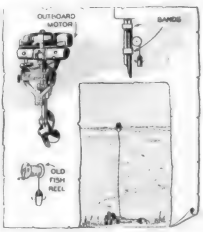
THE usual way of fastening the cotter pin in a lock nut is to insert it with the flat edges in a vertical plane, bending over both prongs. This secures the nut in place, but it also makes it unnecessarily difficult to remove. A better method is to insert the pin as shown in the drawing at the right, with the flat prongs parallel with the width of the nut. Thus it is only necessary to bend up one prong in order to lock the nut. To remove the pin, all that is necessary is to grasp the pin head with a pair of pliers after flattening down the prong between the jaws.—Normand Saunders.

Shortening a Lamp Cord



AN ORDINARY spring clothespin can be used to shorten a length of electric light cord which permits the lamp to hang down too far. Clamp the wire in the jaws of the pin as shown in the drawing at the left, bringing it around and up through the tail of the pin in the form of a loop. The tension of the pin is sufficient to hold a large sized lamp, and the cord can readily be lengthened if desired.—Joseph McCune.

Locating Lost Outboards



IF YOU want to be sure of finding your outboard motor if it should sink—as sometimes happens when obstructions are struck or the clamps loosen—attach an old fish reel along the drive shaft with wire, just as it is fastened to a fish rod. Attach forty feet of line to a bobbin with inverted hooks. When the motor sinks, the bobbin will rise to the surface of the lake, or near enough, in case of deep water, to be caught by a drag line. It is then a simple matter to attach a rope to the motor and haul it up.—Theo. Allen.

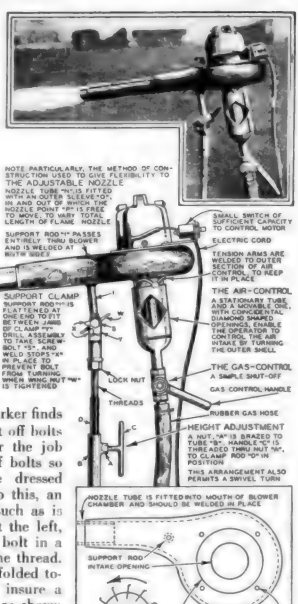
Wick in Teapot Makes Serviceable Light

A CONVENIENT light for certain types of night work can be easily assembled out of an old teapot. Insert in its spout a wick of twisted rope or cotton. Fill the pot with kerosene to cover the bottom of the wick. When the oil has saturated the wick, light the lamp at the spout. A smooth-burning flame which supplies considerable illumination is produced, and the lamp can easily be carried about from place to place. Condition of the teapot is of no importance except, of course, that if it contains any holes these must be well above the oil line to prevent leakage.—Alfred Allard.

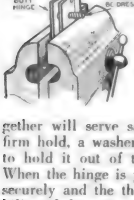
Blow Torch from Vacuum Sweeper

AN INGENIOUS Los Angeles mechanic has made a handy blow torch from parts of a discarded vacuum-sweeper. He has assembled the motor and turbine with a simple mixing chamber upon an adjustable standard. A large nozzle has been fitted, made from a section of steel tubing. The drawing at the right gives details of its construction.

The sleeve on the mixing chamber regulates the amount of air required through a diamond-shaped opening. The correct length of the nozzle determines the efficiency of the flame, and this is worked out by experiment. Note the electric cable and convenient switch; also gas control and adjustable standard. City gas is used.



Hinge Clamp Holds Bolt in Vise



OFTEN the shop worker finds it necessary to cut off bolts that are too long for the job in hand. The ends of bolts so shortened should be dressed down with a file. To do this, an auxiliary arrangement, such as is shown in the drawing at the left, is necessary to hold the bolt in a vise without damaging the thread. An ordinary butt hinge folded together will serve satisfactorily. In order to insure a firm hold, a washer is slipped over the bolt as shown to hold it out of the countersunk hole of the hinge. When the hinge is pinched in the vise the bolt is held securely and the threads are protected from all possibility of damage.—Lester P. Young.

Wind Vane Figure Beats Drum With Moving Arms

AN INGENIOUS weather vane containing the small figure of a man who beats a drum with his arms when the wind blows can be made after the design shown at the left. The drum used can be made out of metal, or perhaps you will have access to a small toy, one which can be made to suit. The arms of the figure are pivoted loosely and are cut to present rather a broad surface to the wind. Being placed as shown on the weather vane, the figure always has his back to the breeze. The vane point is of metal for counterbalance.

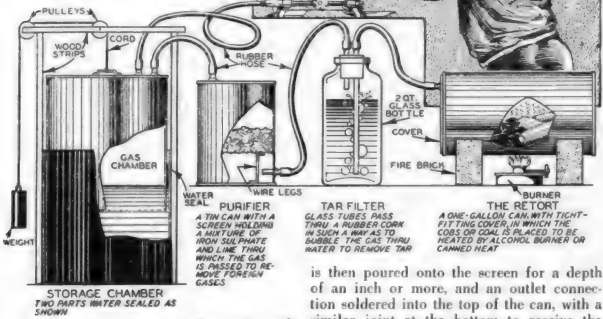
A Miniature Gas Plant

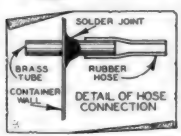
IF YOU happen to live outside the city and do not have access to local gas mains, you can nevertheless enjoy the use of gas-operated equipment by constructing the miniature gas plant pictured here. The amount of gas constantly "on tap" will depend on the size storage chamber built. Coal, corn cobs, or similar fuel is used as a source of the gas.

The drawing explains the elements of the gas plant clearly. A tin can of gallon size with a tight-fitting cover is used for the retort. As shown in one of the detail drawings, this retort is connected by means of a rubber hose to a water filter which removes any tar from the gas. This filter is simple, consisting of a jar three-quarters filled with water, through which the gas is forced, to escape through a second tube in the top into a purifier.

The purifier is made of a tin can in which a wire screen has been mounted on wire legs a couple of inches above its bottom. A mixture of iron sulphate and lime is then poured onto the screen for a depth of an inch or more, and an outlet connection soldered into the top of the can, with a similar joint at the bottom to receive the gas from the filter.

Next comes the construction of the storage chamber. This is made of two tin cans with their tops cut off, one can sliding inside the other, much like the large gas storage chambers used to keep gas under pressure in cities. Water is used as a seal to prevent imprisoned gases from escaping. The sliding top of the chamber is provided with a counterbalancing weight working over a series of pulleys on a wooden framework. This weight must weigh slightly less than the section of the can which it moves, in order that the gas, when it enters the chamber from the purifier, will be able to push the top section up by its own expansive force. The gas is thus kept under a slight pressure which will force it through the take-off tube. Fuel from which the gas is produced is heated by an alcohol or canned heat burner. Experiment will show how much fuel is necessary.





Showing parts of simple home-built gas plant which will provide an adequate supply of gas from coal, corn cobs, and similar fuels.

Making PHOTOS as

With this gigantic enlarging camera, the department of agriculture photographic experts produce immense photos for farm lectures.

WHEN Uncle Sam does anything he generally does it on a grand scale. And at the photographic bureau of the Department of Agriculture he carries out these well established principles by turning out photos that are as big as billboards.

These photos when completed are distributed throughout the country to the various agriculture schools and to special agriculture classes carried on for the benefit of farmers who wish to acquaint themselves with the latest developments in the science of farming. With one of the immense photos before them it is much easier for a lecturer to instruct his class in the qualities and nature of the diseases of farm animals, and the points to look for in selecting breeded stock.

At the photographic bureau in Washington, where the work of producing the gigantic photos is carried on, there is a staff of experts at work developing and printing the billboard photos for distribution to the schools. The chief feature of the photo laboratory is the mammoth enlarging machine shown at the top of the page. An ordinary negative is inserted in the enlarger and projected on the sensitive enlarging plate. Such a process is the equivalent of making a gigantic snapshot.

After the shot is made, the photo experts take the paper into the laboratory for developing. This process is much the same as the making of an ordinary print, save that the work is carried out on a larger scale. In the laboratory the prints are placed in large tanks filled with the developing fluid, which brings out the picture. This work requires expert handling, as the least slip or error in the mixing of the developer will result in a poor picture.

The completed photos are often of such size that they are built up in sections, much as the sections are pasted up to make a complete billboard sign. When this is necessary only part of the photo is made and printed at one time. Later a mosaic of the entire photo is laid out.

The photos are then ready for distribution. Among them are included photos of cattle of all kinds, cattle inflicted with all kinds of diseases, and in all conditions of

Big as BILLBOARDS

The small negatives are projected for enlargement against the enlarging paper, as shown above.

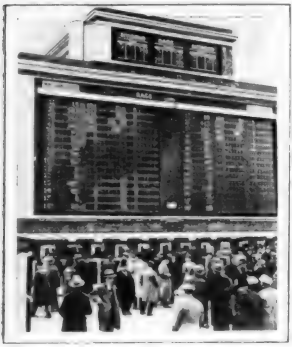
The mammoth prints are developed in this immense tank.

health. Not only are cattle photos made but also hogs, chickens, sheep and all kinds of farm animals.

The visual demonstrations made possible by these photos serve to enlighten students more adequately on the nature of cattle diseases and defects. Better cattle breeding is naturally the ambition of all progressive and scientific farmers. With one of these photos a scientific lecturer with a pointer can accomplish wonders in the way of instructing farmers.

Sometimes the photos are so large that they must be built up in sections to form the completed picture. Expert knowledge is required for this work.

New Giant Electric Totalizer Used at English Race Track



The exact odds on each horse are always posted.

THIS giant electric totalizer, recently installed at the Newmarket race track, is operated entirely by electricity and is said to be the finest achievement the world has yet seen in this field. The machine will handle the bets on forty-five horses in any one race and will immediately post the chances in odds and the total amounts bet on each horse no matter how rapidly such bets are placed.

Various booths are located in front of the totalizer building. These booths are marked with the denomination of the bet to be received and whether bets received are for "win," "place" or "show." The backer announces his horse and the clerk presses a button which issues a printed ticket while at the same time recording the transaction at once on the totalizer board.

The ticket issuing machines are miniature printing presses and are electrically wired to the auditing machines which are fool and fraud proof. Three auditing machines are provided for each horse, one for each position on which bets are paid. The betting is closed immediately the horses reach the post and the backers are able to see immediately, exactly the amount they will receive on their tickets.

Smallest Gasoline-Driven Motor

WHAT is believed to be the smallest perfect working model of a four-cylinder gasoline driven automobile motor was recently completed by a student at the University of Illinois after five years of work. The model was made entirely by hand and develops ¼ horsepower with a 3/4-inch bore and one-inch stroke. The engine will run for several hours on one quart of gasoline contained in the tiny tank.

This motor develops ¼ horsepower with a ¾" bore and 1" stroke.

Electric Iron Freshens Old Ties

The iron is hollow, with a heating coil in the blade. It is equipped with an insulated handle.

A QUICK and modern way for keeping neckwear looking fresh and new is furnished by this electric tie iron which has recently been placed on the market. The device is light and compact, the heating coil being placed in the almost knife-like blade. The cord may be attached to any socket.

To use the device, the cravat is moistened with a cloth or sponge, the iron is heated until it steams when touched with a moistened cloth and is then inserted in the tie, care being taken to keep the lining straight. The face of the tie is then stroked lightly with a moistened cloth, smoothing the tie and bringing up the nap.

English Tea Room in Historic Old Tree Attracts Diners

IN THE days of highwaymen the old tree at Cobham on the London-Portsmouth road in England, was probably often used as a hiding place. Nowadays, however, the tree serves a more useful and pacific purpose, and is used as a tea room by many tourists every year, as shown in the photo at the right. The tea-table, which stands in the hollowed out trunk of the oak, is approached by means of a stairway which is built into the side of the tree. During the summer there is often lively competition among customers to be allowed to use this original tea room.

This unique English tea room seats eight people.

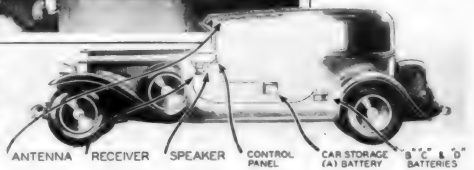
Criminals Identified by Teeth

USE of teeth instead of finger prints for the identification of criminals has recently been advocated by an eminent Vienna criminologist. The finger tips, he points out, are likely to be injured or destroyed by accident, or obscured when a person is drowned or exposed to weather. Teeth, however, do not suffer from such accidents, and like finger prints, it is virtually impossible for any two sets of teeth to be alike.

Radio Equipment for Autos Brings Broadcast Programs to Motorists

RADIO, it seems, is destined to be installed in everything that flies, runs on wheels, or floats on water. The fast moving auto is the latest vehicle to be invaded by radio's onward march.

Equipment has recently been placed on the market for installation in automobiles. As shown in the photo below, the control dials are installed on the dashboard, while the apparatus occupies a small space up under the cowl. The location of the loud speaker is optional, the space under the cowl being preferable. The antenna is ordinarily strung up in the roof, but many cars are equipped with built-in and invisible antennas, especially in the de luxe models of expensive makes.



A special dashboard control panel adjusts the receiver, which is placed to the front with the loud speaker, as shown. The compact antenna can be located in roof or built in.

GIANT JUNKERS AIR LINER

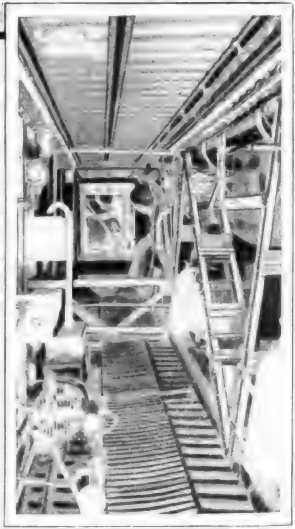
The mammoth plane levelling off for a landing.

FOLLOWING closely on the heels of the successful flights of the giant Dornier "DO-X" comes the announcement that Professor Junkers, the seventy-year-old German pioneer airplane builder of Dessau, has made highly pleasing test flights with his "Goliath G-38."

Although not a true "flying wing," the Junkers monoplane has adopted many of its features in order to cut down parasite resistance. The four engines have been placed in the leading edge of the single unbraced wing while the fuselage is extremely small for a plane of this size, being not much more than a strut to hold the tail assembly after the trailing edge of the wing has been passed.

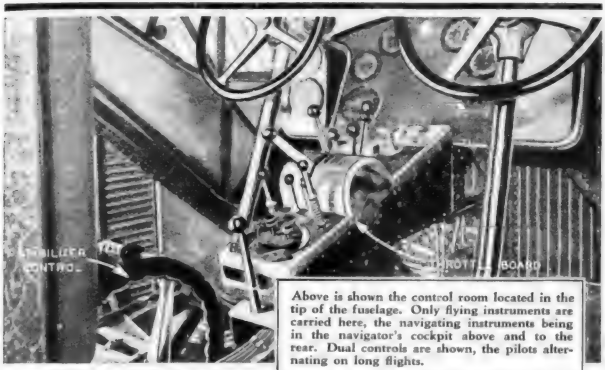
The four Junkers engines, developing 2400 horsepower, lift a flying weight of 48,000 pounds, of which eleven tons are pay load. Used for passenger transportation only, the plane will carry 40 passengers on a non-stop flight of 3,000 miles, making the crossing of the Atlantic with a paying load entirely within the bounds of reason.

The pilot's control room is located in the extreme tip of the fuselage, while directly behind and above is the commander's room, connected to all parts of the ship by phone and equipped with the latest navigating instruments.

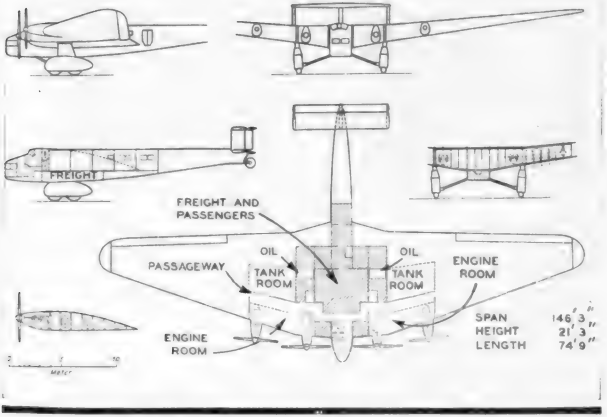


The engine-room passageways, showing the corrugated metal construction of the wings and internal bracing. Note the gas tanks at right.

Designed for OCEAN TRADE



Above is shown the control room located in the tip of the fuselage. Only flying instruments are carried here, the navigating instruments being in the navigator's cockpit above and to the rear. Dual controls are shown, the pilots alternating on long flights.



Detailed construction of the giant transport is shown in the above drawings. The passengers' observation compartment is located in the leading edge of the wing, while sleeping and living facilities are provided behind. Gasoline tanks behind the wing passageways are so constructed that the fuel may be dumped in case of emergency. Large compartments are provided for freight and baggage.

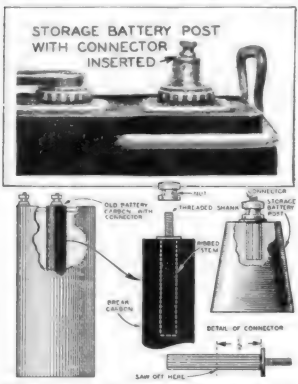
SPARKS from the RADIO EDITOR

Edited by L. B. ROBBINS

This month marks the beginning of the radio season. After the summer lull it will feel good to start the signals rolling in again from distant points. Mr. Robbins offers in this issue a few practical hints for caring for your apparatus and plans for building radio equipment at much less expense than if purchased ready-made.

Dry Cell Connectors Fit Automobile Battery for Radio Use

MANY times owners of battery operated radio sets want to reduce expenses by making their automobile battery serve for both the car and the radio. Car battery terminals, however, are not suitable for the connection of wires from the radio set. Here, as shown in the drawing and photo below, is a simple way that convenient connectors can be attached to the battery terminals. Such connectors will provide an excellent grip, and will not interfere with the cable clamps of the car.



With the dry cell connector inserted in hole bored in storage battery post, as shown, the cable clamps of car can be slipped over easily.

First pull the carbon out of an old door bell dry cell, as shown in the drawing at the left. Then draw the connector from the carbon and saw off about half of the ribbed stem. Next drill a small hole vertically down the middle of the storage battery post of a size that will make a tight fit for the connector shank. Now drive the shank down the hole, using lead as a protector, so that the metal will not be ruined by the hammer blows. The connection should be greased with vaseline to prevent corrosion.

Air at 200 Miles Rare as in Tube

IF YOU could attain an altitude of about two hundred miles in an airplane you might be able to get some idea as to the rarity of air in the vacuum tube that you use in your radio receiving set. At this height where the atmospheric pressure is next to nothing at all, the rarity of the air is about equal to the rarity of the air in the vacuum tube. The machines which exhaust the air from these tubes at the factory must be built with exceptional strength to withstand the pressures involved.

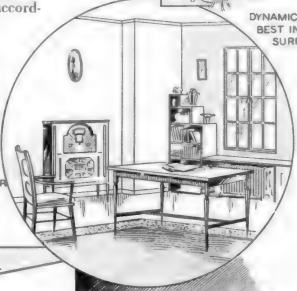
The loud explosion which occurs when you burst a radio tube gives some idea of the utter emptiness within.

Shift Position of Your Loud Speaker for Better Music

THERE is a little game you can play some evening with your radio loud speaker and, if you win, your reward will be better reproduction of music. The name of the game is "Shift the Speaker," and the rules are those which apply to the physical science of sound. As the name implies, the game consists simply in moving the loud-speaker from one position to another in the room till you find the one that gives clear-est reproduction.

A speaker of any kind, for the most satisfactory results, should be placed at ear level, according to Dr. Dayton Miller of Cleveland, well known authority on acoustics. Another precaution is that of providing a suitable reflecting surface for the sound. The ideal position for a speaker, as shown in the drawings, is a hole in the wall, with the edges of the horn flush with the wall. If a separate speaker is used, a position in a corner formed by the intersection of two walls, which serve as baffle boards, will prove an efficient one.

DYNAMIC TYPE SPEAKER SERVES BEST IN ROOM WITH PADDED SURFACES (GOOD)



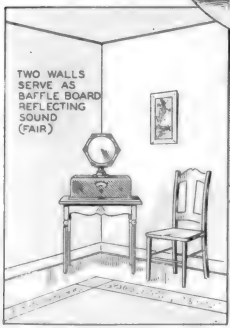
MAGNETIC TYPE SPEAKER BEST IN ROOM WITH BARE, HARD SURFACES (GOOD)

Room furnishings also have a lot to do with the quality of music emitted from your loud speaker. Fortunately most rooms strike a happy medium, having about the right combination of padded and hard surface.

However, care should be taken not to have a room too barely furnished, so that there are large unbroken walls which produce maximum resonance effects and cause distorting echoes. In such a room, a loud speaker of the dynamic type which emphasizes the bass notes will eliminate some of the distortion.

On the other hand it is not advisable to have the room overfurnished; that is, there should not be too much padded, or "dead" surface, such as that caused by rugs, draperies, and overstuffed furniture. In such a room there is a total absence of reflection, and music in a room with non-echoing walls is a most unpleasant thing to hear.

The situation here can be remedied by the use of a magnetic type of speaker.



TWO WALLS SERVE AS BAFFLE BOARD REFLECTING SOUND (FAIR)

SPEAKER FLUSH WITH WALL IS IDEAL POSITION FOR CLEAR REPRODUCTION (BEST)

Take These Precautions in Caring for Storage Batteries

THERE are such vast differences between the common acid type storage battery and the Edison alkaline type that users in caring for them often make serious mistakes through ignorance of these differences. One of the most common mistakes is made when the alkaline battery is tested with a hydrometer that has just previously been used with an acid battery. This will often prove disastrous to the alkaline battery, as the introduction of the least bit of acid will ruin the electrolyte of the Edison cell.

Always use a clean hydrometer when testing Edison cells. For best operation, the specific gravity should be kept at 1250. This applies whether the battery be charged or discharged. To determine the voltage, use nothing but a voltmeter. Hydrometer readings mean nothing in this respect.

The great advantage of alkaline batteries is that the elements will last almost indefinitely. The battery solution, however, must be changed about once a year. The only care required for normal upkeep is the occasional addition of distilled water and a little mineral oil to prevent evaporation.

Acid or lead batteries, however, distintegrate after a few years' use and need rebuilding. This task requires the knowledge of a battery expert; no layman can safely perform the job without running a chance of ruining the cells. When in use, the terminals of the lead battery should be greased with vaseline to prevent poor connections caused by corrosion.

As a source of filament power, the alkaline battery will serve best, as it is better adapted to conditions where the current drain is small but continuous. Where sudden and heavy charges of current are required, the heavy duty lead acid type battery serves best.

This Easily Made Rectifier Materially Cuts the Cost of Battery Upkeep

LUGGING a heavy storage battery to the nearest service station for recharging is a burdensome task for the car owner or radio fan who operates a receiver which utilizes a storage battery as a source of filament power. All this can be eliminated, however, by spending a few hours in the electrical shop constructing a simple vibrating rectifier, such as shown here. Such a charger is very efficient and will pay for itself in a short time.

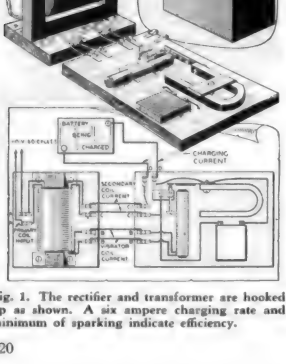


Fig. 1. The rectifier and transformer are hooked up as shown. A six ampere charging rate and minimum of sparking indicate efficiency.

The 110 volt alternating current must be stepped down through the transformer shown in fig. 3, which delivers two voltages, one for charging purposes, the other for actuating the vibrator. The transformer is built up of pieces of transformer core iron, or of ordinary sheet iron that has been shellacked on one side. Holes are bored in the ends to admit the bolts which clamp together the completed core. The dimensions and method of assembly are given in figure 3.

It is best to assemble the part of the core around which the coils are wound first. This core is wrapped with four thicknesses of wrapping paper soaked in shellac and fibre ends placed in position shown to prevent spreading of the wire. Over the paper is wound the primary coil, which is composed of 600 turns of 20 D.C.C. wire. The leads are brought out at the ends and soldered to the Fahnestock clips. Over this winding is wrapped four layers of friction tape for insulation. Next 85 turns of No. 14 D.C.C. magnet wire, which constitute the secondary, are wound on, and friction tape applied as before. Finally the outer, or vibrator current coil is wound on. 25 turns of No. 24 D.C.C. serves the purpose here. The leads are brought out the ends, soldered

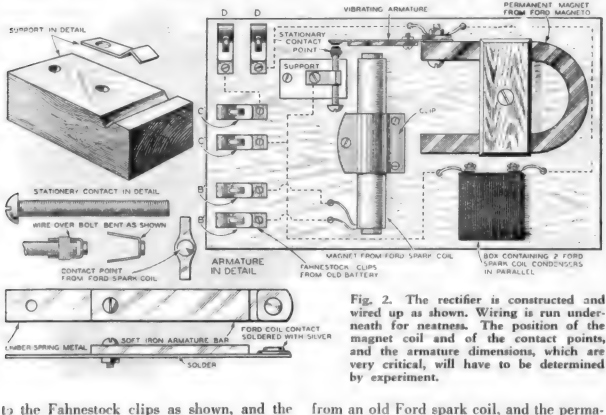


Fig. 2. The rectifier is constructed and wired up as shown. Wiring is run underneath for neatness. The position of the magnet coil and of the contact points, and the armature dimensions, which are very critical, will have to be determined by experiment.

to the Fahnestock clips as shown, and the entire coil neatly wrapped with black friction tape.

This finished, the rest of the core is assembled and bolted together. The completed unit is mounted with braces as illustrated.

The vibrator unit shown in figure 2 is the most important part of the charger, and success depends largely upon its proper adjustment. To construct it, secure first the magnet, or primary coil, and the condenser from an old Ford spark coil, and the permanent magnet from an old Ford magneto. Fasten these to the base board as shown. Secure next a piece of limber spring metal and a piece of soft iron and bolt and solder them together to form the vibrating armature. This armature is bolted to the bottom of the permanent magnet. Different sizes, weights, and lengths of the iron and spring will have to be tried out before the correct balance is found.

Contact points cut from the vibrator of an old Ford spark coil form the contact points for this charger. The stationary contact is wired on as shown, and the armature contact is soldered on by heating the metals red hot and soldering with silver solder, using borax and water as flux.

When the transformer and rectifier units are completed they are hooked up as shown in figure 1. Some experimentation is now necessary. The polarity of the charging current terminals is determined by immersing wires from them in salt water. Bubbles will be produced at the negative wire. This wire goes to the negative of the battery, the other to the positive.

An ammeter should be placed in the circuit as an aid to operation. The position of contact points and vibrator magnet, and armature length must be adjusted.

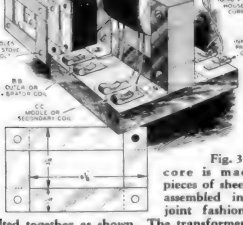


Fig. 3. The core is made of pieces of sheet iron assembled in butt joint fashion and bolted together as shown. The transformer coils can be wound on a lathe and slipped over the core.

How to PRESERVE YOUR

A closeup of a tree attacked by rot fungi. A limb had been sawed off years ago and the wound was improperly treated, resulting in this decay.

At the right the tree surgeon has outlined the cavity. Notice the holes where he has bored deep into the trunk to determine the extent of decay. Also notice the shape of the cavity — how the sides are cut parallel to the sap flow and how the ends are pointed to make possible rapid healing after the cavity is filled.

A TREE will fight heroically for its life, even against great odds, but it must often have the help of man. This is particularly true when the tree is attacked by heart rot fungi, the enemy which eats insidiously into trunk and limbs, destroying the solid wood and leaving behind a porous, rotten mass which can be crumbled in the hand and powdered into dust.

The tree has no chance to repel heart rot fungi unaided. That is because these fungi concentrate their attack upon the heart-wood, the tissues of which have become inactive and can no longer fight back. Once lodged in the heart-wood the fungi penetrate deeper and deeper, spreading in all directions. Eventually the tree is so eaten away that it becomes nothing but a hollow shell. A slight gale and it goes over.

There is something fascinating in the way the tree surgeon cuts open the cavity, cleans out the rotten wood, kills the remaining fungi with a powerful disinfectant, and then puts in concrete filling which restores the tree's strength and prevents reinfection. The steps are pictured here.

The tree surgeon, in fighting the fungi, has certain definite things to accomplish. He must get rid of all trace of the fungi. He must replace, as far as possible, the mechanical support lost because of the decay. He

The bark having been removed from the face of the cavity the surgeon is now ready to remove the decayed wood. By boring holes along the edges with a power drill the work is facilitated.

Injured TREES

by MARTIN L. DAVEY
President, Davey Tree Expert Co.

must provide a surface over which healing can occur. He must protect the tree from reinfection.

Before treating a decay cavity, the tree surgeon makes a complete diagnosis to determine the exact extent of decay and the tree's general condition. Sometimes its vitality is so low that it would be money wasted to make cavity fillings. In such cases, the tree is given plenty of food and water, and if it responds satisfactorily, the decay is attacked.

If the tree surgeon finds that the tree's vitality is good, he proceeds to determine the extent of the cavity. Holes are bored deep into the wood above and below the points of infection. The cavity opening must be made large enough to remove all decayed and infected woods and its size can be determined only by the boring tests.

At the left the concrete filling is being installed in sections, each section separated by a layer of joint material. These sections function in much the same way as the vertebrae of a person's backbone, providing strength yet yielding to twisting and bending. At the right is shown the completed job. Rot fungi and decay has been stopped and the tree's structural strength has been restored. Eventually the filling will be entirely concealed by bark which will grow from both sides.

After cleaning out the rotton wood, steel rods are installed to bind the walls together. These rods serve the same purpose as the beams of a house and are essential if the cavity is large.

After determining the extent of decay, he proceeds to outline the cavity opening. The bark is removed with sharp chisels and the surgeon must make sure that at the edges of the cavity, the bark is left undisturbed. If it is sprung loose from the tree, it invariably dies back, prevents healing, and exposes the tree to reinfection.

The shape of the cavity opening is determined by the course of the sap flow, the sides of the cavity being made as nearly parallel to the flow as possible. This per-

(Continued on page 196)

An AIRPLANE Swing

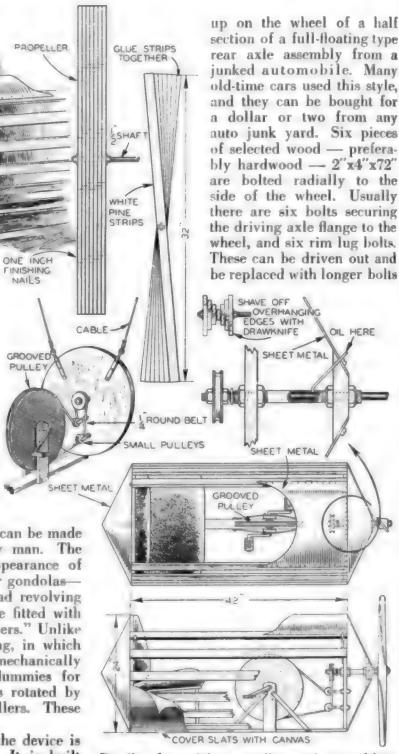
Children will get endless hours of fun out of this airplane swing, run by pedal-driven propellers. Any handy man can build one out of inexpensive junked auto parts and a few lengths of pipe.

Covering the gondola body.

OF ALL the sensational "rides" at an up-to-date amusement park, perhaps none is more thrilling than an airplane swing. It affords many of the sensations of actually flying, but without any danger. There is no case on record where a passenger has been seriously injured in an airplane swing. So, while it may look spectacular to see the cars of the swing whirling over people's heads, the hazardous element is lacking in a strongly constructed swing.

A home-made airplane swing can be made at a small cost by any handy man. The drawing shows the general appearance of the finished swing. Six cars—or gondolas—are suspended from the overhead revolving frame. Only three gondolas are fitted with propellers; the others are "trailers." Unlike the usual amusement park swing, in which the overhead frame is turned mechanically and the propellers are only dummies for effect, this home-made swing is rotated by the direct action of the propellers. These can be operated with pedals.

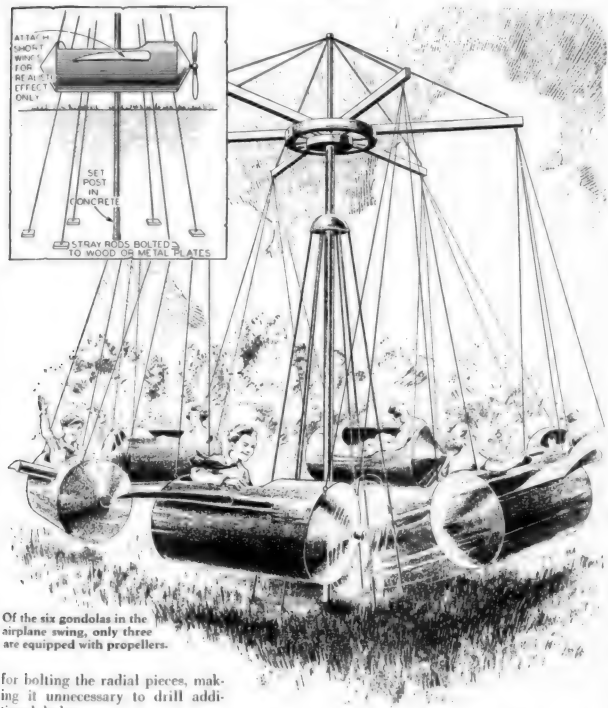
The most important part of the device is the overhead revolving frame. It is built up on the wheel of a half section of a full-floating type rear axle assembly from a junked automobile. Many old-time cars used this style, and they can be bought for a dollar or two from any auto junk yard. Six pieces of selected wood — preferably hardwood — 2"x4"x72" are bolted radially to the side of the wheel. Usually there are six bolts securing the driving axle flange to the wheel, and six rim lug bolts. These can be driven out and be replaced with longer bolts



Details of gondola, propeller, and gear drive.

for the Back Yard

by DICK COLE



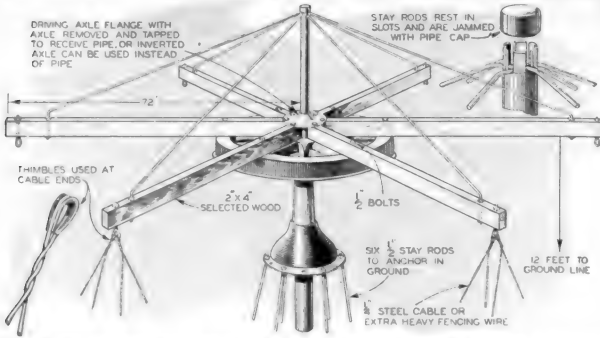
Of the six gondolas in the airplane swing, only three are equipped with propellers.

for bolting the radial pieces, making it unnecessary to drill additional holes.

The radial pieces should be strengthened with stay-rods as shown. In the drawing, a length of pipe is used to support the stay-rods at the middle, but in many cases the driving axle itself can be reversed and will serve the purpose even better.

At the end of each radial piece is a substantial eyebolt to which the swing cables are attached. Quarter-inch steel cable is recommended, but heavy fencing wire will serve. The cable or wire should pass around cable thimbles to prevent chafing. It is obvious that the thimbles will have to be spread open slightly to be placed within the eyebolts. Afterward they are closed again, and the cable or wire put in the

Overhead Revolving Frame Is Built From an Auto Rear Axle Assembly



Showing how the wheel and a half-section of a full-floating type rear axle assembly is used as a base for the overhead revolving frame. The six swing supports are made of selected hardwood.

thimble groove and twisted a few times. The free ends of the cable should be left about 11 feet long for attaching to the swing gondolas.

After the overhead assembly is complete, it is rigidly attached to one end of a 15-ft. length of 2½-inch iron pipe. The method of doing this depends upon the axle housing design. Sometimes the pipe can be inserted into the housing and be bolted or brazed. Whatever method is employed, it must be absolutely solid. The other end of the pipe is now set firmly in the ground. It is suggested that a floor plate be used on the end of the pipe to prevent it settling. Stay-rods are also necessary. It is well to set the pipe and the rods in concrete, but if sunk deeply in firm soil, and tamped with rocks, sufficient solidity can be had.

Next come the swing cars, or gondolas. The drawing suggests a design which will prove satisfactory. Of course the builder can make gondolas that more closely resemble airplanes if he desires to, but the one illustrated offers the all-essential factor—safety. The sketch makes the construction obvious. The most important point is the bearing for the propeller shaft. The shaft must be oiled freely.

The propeller shaft is of ½-inch cold-rolled steel threaded at one end to receive the propeller, and at the other end to receive a small, grooved pulley.

The pedaling gear is not shown in detail in the drawing. Its construction depends upon the material and facilities one has at hand. Two wooden disks about 18 inches in diameter can be beveled on one edge and then be bolted together to form a satisfactory pulley. Or a bicycle or velocipede wheel, with tires removed, can be used for the driving pulley. The gear ratio should be such that the propeller can be turned about 750 r.p.m. with comfortable pedaling. Leather belting ⅜ inch round, is used for transmission. The sketch shows how this passes around the pulleys.

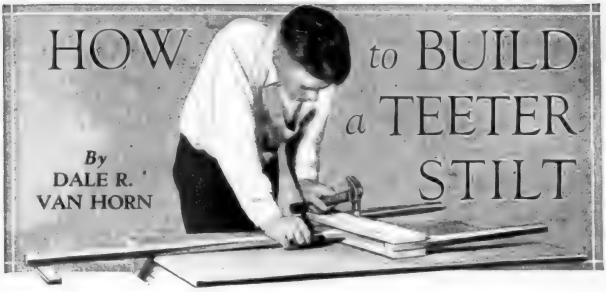
The construction of a suitable propeller may seem like a rather difficult job to many. Yet an efficient propeller can be made very simply as shown. Instead of being cut from a solid block, this prop is built up of slats—laminated, as it were. Not only does this method result in a very strong propeller, but it also has inherent balance and uniform pitch. The center holes of the slats should be so small that the propeller shaft must be screwed into them, and afterward be locked between two nuts and large washers. Glue on the threads will make the attachment even more rigid.

The propeller illustrated is intended to be foot operated at 750 r.p.m.

We now have an airplane swing. If built according to directions, there is no danger of its collapsing.

HOW to BUILD a TEETER STILT

By DALE R. VAN HORN



HERE'S something new in the way of a sport device. It is dubbed a teeter stilt, which is a rather apt description. Built like a huge, two-tined fork, you mount it just as you would a pair of stilts and then progress along (providing you keep your balance) by teetering from one side to the other. This is done by means of the hands on the handles and also by an easy body movement. But to use the teeter stilt well calls for some practice.

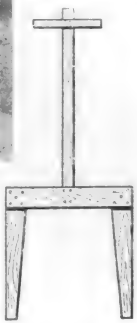
There is no particular danger in learning to use it as if you tip forward, either foot can be slipped off the stilt and set down upon the ground; while if the improper balance is to the rear, one steps down in the same way. In a short time you will be able to teeter along on sidewalks or the road with perfect ease and no small sense of accomplishment. Its use is excellent for training of mind and muscle coordination, and after a short bit of practicing you will be surprised at the ease of this novel form of locomotion.

Only six pieces of wood—pieces which are probably already lying about the shop—are needed. Most of them, however, should be of tough lumber, or hardwood. You will need the following:

1—1"x1½"x3'-6" for upright
1—¾"x1½"x1'-4" for hand grip
2—¾"x3¾"x2'-2" for foot supports
2—⅞"x2"x⅞"x3"x2'-0" for tapered legs. (Lengths can vary.)

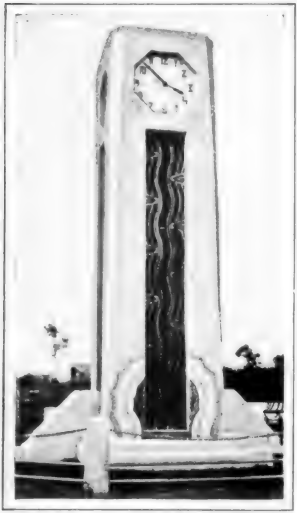
The parts are cut and assembled as shown with nails and screws. Before nailing, apply a good grade of glue to all adjacent joint surfaces to prevent "give" and increase strength.

Oak is a good wood to use throughout, particularly for the legs, handles, and handle support. The cross piece to which the legs and upright are attached can be of fir or pine. Use of screws instead of nails results in a sturdier construction job.



Variations in the height of handles and length of legs will naturally be dependent on the stature of the stilt operator. Drawing at right gives front and side view of stilt, showing proportions clearly.

Mexico Ornamental Kiosks for Broadcasting in Parks



Monumental towers such as that above provide radio programs to listeners in Mexico City parks.

STRIKINGLY beautiful evidence of the popularity of radio is found in the public loud speakers housed in imposing kiosks, located in residential parks in Mexico City. The structure is of reinforced concrete and topped by a four-face clock.

Set in each of the four sides is a longitudinal panel of ornamental grill work behind which the loud-speaking apparatus is installed. It stands approximately 20 feet high and affords entertainment to thousands who gather at stated hours to listen to concerts from their own broadcasting stations and also from United States, Canada and South American cities. The kiosk stands on a slight rise and is protected by a chain fence. Outside this barrier is a circle of concrete seats. The latter accommodate only a small part of the audiences, however.

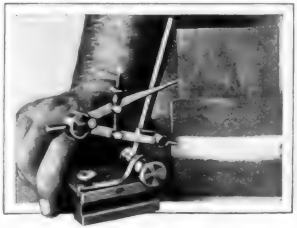
Radio Tube Makes Iron Holder

A HANDY soldering iron holder can be made from the base of a burnt-out radio tube. The glass bulb is broken off and the edges ground or filed smooth. The base is turned up-side-down on the bench so that the soldering iron can be laid on the prongs. The base requires only a small space on the bench and the iron can be placed on it from almost any position.

Base of an old radio tube holds soldering iron.

Doubling Surface Gauge Uses

EVERY mechanic does not possess two surface gauges, yet there are times when a couple of these tools would be mighty handy. Frank Moore, up in Hamilton, Canada, discovered recently a simple way to make one gauge do the work of two and presents the idea in the accompanying photo. A glance will show that the kink consists in removing the scriber and inserting in its place one leg of a pair of spring dividers. The leg that is held in the gauge is set by using the adjusting screw on the surface gauge while the other leg is set by means of the nut on the dividers. Thus two lines of different heights can be laid off at the same setting.



Spring divider is set for surface gauging.

Combination Stool and Dryer Saves Steps for Housewife

AN EXTREMELY convenient and serviceable device to have around the kitchen or wash house is the combination clothes dryer and kitchen stool, shown at the right. It serves ordinarily as a stool, but when it is desired to utilize it as dryer, the metal rods are pulled up through the holes in the seat and locked in place so that they stand out horizontally. When not in use the rods in no way interfere with the comfort of the seat.

The stool is made of metal, with a wide spread of the legs to prevent tipping. Many tiresome steps can be saved by the use of this stool-dryer, and much-needed space can often be conserved.

Metal rods are pulled up through seat of stool to form dryer arms.

Device Transfers Air Fuel Safely

Fuel is transferred from supply plane with this device by maneuvering automatic nozzle into v-shaped arm on wings of receiving plane.

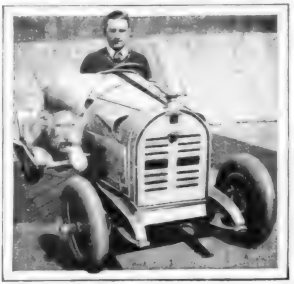
DANGERS of transferring gasoline from one plane to another while in flight are practically eliminated by the use of the invention for that purpose, shown in the photo above. The fuel transferring device consists of two separate units—one for each plane. The supply plane carries on a special reel a supply hose with a nozzle that operates automatically upon contact with the receiving plane's tank.

The receiving plane unit consists of a v-shaped arm into which the supply plane maneuvers the nozzle. An automatic clamp fastens the nozzle in place when contact is made, and also connects a telephone cord on the hose, permitting the two pilots to give and receive directions while in flight.

In the future the air liner need not load itself with fuel, but can pick it up en route.

Auto Racer Carries Pet Lion

IN ORDER to carry his pet baby lion around with him while motoring about town, a prominent San Francisco sportsman built a special side car device on his runabout, as shown in the photo below. The lion has been trained to "stay put."

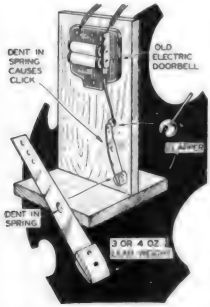


AMATEUR ELECTRICIAN

Edited by
THEODORE ALLEN

Electricity enthusiasts can save a surprising amount of money and unnecessary labor by applying their ingenuity to the construction of electrical appliances used in everyday life. This month, Mr. Allen, widely known electrical expert, presents plans for the inexpensive construction of devices that are both interesting to make and serviceable.

Old Door Bell Serves as Mechanism for This Metronome

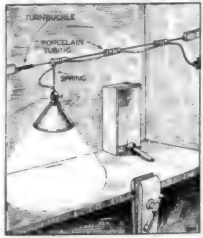


THE ordinary metronome used in timing music runs by clockwork and must be wound up every so often. With a simple door bell and an alarm clock spring about 12 inches long, however, you can make a very efficient metronome that will run continuously by merely turning on a switch as shown in the drawing at the left.

A slot is first cut in the clapper of the bell, and a hole bored through to admit the bolt which holds the pendulum. The pendulum is made of the length of alarm clock spring, which is dented in the middle by a blow from a hammer. This causes it to click as it swings. At the end a lead weight is attached to give the slow swinging motion.

The timing of the swing is adjusted by screwing the vibrator contact in or out and by lengthening or shortening the spring pendulum. These adjustments are easily made after you have done a little experimenting.

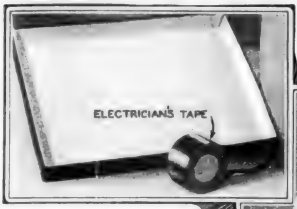
Workbench Light



ALTHOUGH nothing is more important than good lighting, the average handicraftsman's workbench is ordinarily lighted very poorly. A simple and efficient lighting system may be rigged up by following the drawing at right. Three or four porcelain tubes are slid over a wire whose ends are attached to joists by means of screw eyes. This wire may be held taut by inserting a turnbuckle at one end of the line.

Next tape lampcord to the porcelain tubes in loops that are long enough to permit the light to slide to the end opposite the outlet. The lamp may be adjusted to any desired height by hooking a coil spring over the tube supporting the light. Taking up or letting out loops in the wire adjusts the height.

Novel Picture Frame Uses Battery to Illuminate Photo



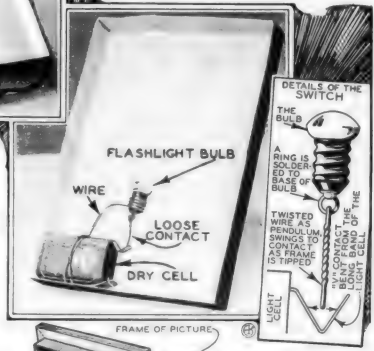
Photos above and at right show how background of frame and electrical connections are made.

AN attractive novelty picture frame which illuminates the subject when it is picked up from a table can be made as shown in the diagrams herewith. An ordinary picture frame is used and the photograph cut to fit. The picture is held up to a light and the portion to be illuminated marked in pencil on the back. Vaseline is then rubbed thoroughly over this area until it becomes translucent.

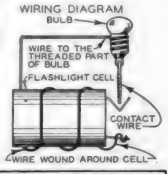
Next, cut and bend a piece of heavy cardboard to form a tray just fitting the rear of the picture frame. Outline the edges of the tray with black tape, as illustrated, to strengthen it. One side of a small flat flashlight battery is connected to a flashlight bulb. A small copper ring is soldered to the bottom connection of the bulb and from this is hung a short length of copper wire, which dangles down and almost touches the other battery contact, which is bent in a V-shape as shown.

This lighting unit is installed in the tray so that the bulb will come just behind the translucent part of the picture when assembled. The picture and tray are then placed in the frame and a piece of cardboard fastened at the rear for an easel support.

It will easily be seen that as long as the frame is in a level position the light inside will be disconnected. However, if it should be disturbed in the slightest degree, such as moving or lifting it from the table, the loose wire hanging from the bulb will complete the circuit with the battery and throw a brilliant light through the picture. When replaced in its original position on the table the light will go out.

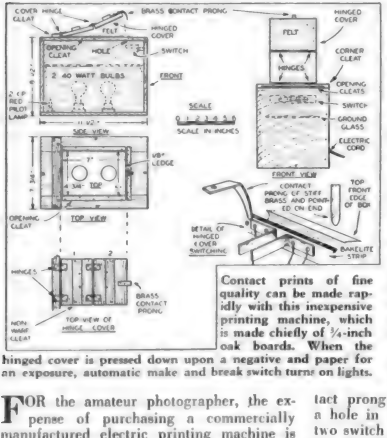


DETAIL OF THE FRAME COMPLETED



At right is the completed photograph in its frame. When picked up from the table the light bulb flashes behind the girl's face, illuminating it. Diagrams above show how this effect is produced.

Home-Made Electric Printer Makes Fine Quality Photos



Contact prints of fine quality can be made rapidly with this inexpensive printing machine, which is made chiefly of ¼-inch oak boards. When the hinged cover is pressed down upon a negative and paper for an exposure, automatic make and break switch turns on lights.

FOR the amateur photographer, the expense of purchasing a commercially manufactured electric printing machine is often prohibitive, and he must blunder along doing his printing in a more or less haphazard manner. However, by the utilization of ordinary material usually found around the workbench a printing machine can be made that is every bit as efficient and speedy as a manufactured one—and at a cost not much more than that of the lights and sockets.

Such a home-made printing machine is shown in the drawing at the top of the page. It is made wholly of oak boards, and turns out contact prints of as good a quality as those of a manufactured printer. The box is built according to the dimensions shown from boards ¾-inch thick, and painted inside with a coat of flat white for illumination.

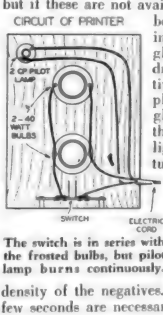
The top is constructed of four pieces of similar wood, and cut to leave a rectangular opening 6¾ inches long by 4¾ inches wide about the center. Beading ¼ inch high is then nailed around the opening, leaving a ledge of the top projecting ⅛ inch wide all around. Thus the measurement inside the beading is 5x7 inches, the size of the standard 5x7 plate. A piece of clear 5x7-inch glass is fitted in the opening, and is supported by the ledge.

A hinged cover is next made for this 5x7 opening by cutting out a piece of ¾-inch stock 5x7 inches with the grain running the long way. This piece is cut in half, forming two pieces, each 5x3½ inches, which are hinged together. Wooden cleats can be screwed on across the grain to prevent warping.

On the underside of the cover a coat of hot, thick glue is spread and on it is stretched a piece of thick felt which is trimmed to size with a razor blade. Hinge one of the halves of the cover to a piece of ⅞-inch stock screwed to the top near the opening as shown, so that the felt pads will rest firmly and evenly against the sheet of glass on the ledge.

The make and break switch device is shown in the diagram. It consists of a stiff brass contact prong shaped as shown which enters a hole in the top and makes contact with two switch prongs inside the box, thus closing the circuit and turning on the lights. The contact springs are mounted on bakelite strips, and should be so arranged that contact is made just as the felt touches the glass.

The printer is wired as shown in the diagram at the bottom of the page. The orange or yellow pilot lamp burns continuously. Frosted bulbs are used ordinarily, but if these are not available, the light may be diffused by inserting a piece of ground glass as shown in the drawing above. Negatives are exposed by placing them on the glass and closing down the hinged cover. The light is automatically turned on, and when the cover is lifted it is turned off. Proper timing will have to be determined by experiment. This will depend upon the density of the negatives. Ordinarily only a few seconds are necessary for the exposure.



The switch is in series with the frosted bulbs, but pilot lamp burns continuously.

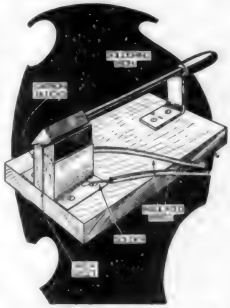
Soldering Irons Heated Quickly With This Novel Device

A HANDY electrical device which will heat the ordinary soldering iron to the desired temperature in about one-third the time required by a gasoline torch, and at a much smaller cost, can be easily made in a short time with a few pieces of scrap material.

On a block of hardwood about 8 inches long and 4 inches wide mount two pieces of 2" by 2½" sheet iron bent at right angles as shown in the drawing at the right. These are placed about 1½ inches apart, and between them are placed two carbon blocks separated by a piece of mica as shown in the drawing. This carbon trough supports the head of the iron. At the rear of the board is mounted a piece of strap iron with a V-shaped end which supports the handle of the iron.

Next two wires are soldered to the metal carbon supports. With half of a heating element resistance hooked in series with one side of the line, these two wires are run to the 110-volt house current, or to the secondary of a ten to one step-down transformer.

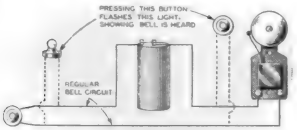
To heat the iron simply lay it in the trough formed carbon blocks. The heat generated by the resistance of the poor connection between the iron and the carbon quickly heats the iron. When the iron is removed the circuit is broken again.



When the soldering iron is laid in the carbon trough, it is quickly heated from the heat generated by the resistance of the poor connection.

A Reply Signal for Bell Circuit

IN USING the bell circuit shown below you cannot always be sure that the party on the other end hears you. However, by the addition of the light and the other push button this circumstance can be eliminated.



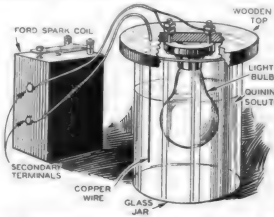
With the addition of extra push button and light you can signal back that bell is heard.

Strong Flashlight for Dark Spaces

A CONVENIENT lighting device for anyone working in dark places and needing a strong light can be made by following the drawing at the left. The bicycle lamp is attached to the battery with a long flexible cord.

This Geissler Tube Glows Weirdly

IF YOU have any necessity to create some weird lighting effects in stage or window decoration, you can do the stunt strikingly with an old Ford spark coil and an ordinary light bulb. The bulb is submerged in a jar of water into which a capsule of quinine has been shaken, and the terminals of the bulb connected to one terminal of the coil. A copper wire which is connected to the other terminal of the coil is also immersed in the solution. Such an arrangement will glow weirdly when the current is turned on. Four dry cells or a storage battery will suffice to operate the Ford spark coil.



The light bulb immersed in quinine solution glows weirdly when current from coil is turned on.

Grain Elevator Dust and Corn Starch Drive Ford Motor

With but minor changes, W. A. Noel, Washington research engineer, has succeeded in running a Ford motor on dust and corn starch.

FLOOR sweepings from a grain elevator and corn starch can run a Ford motor, according to recent experimentations. With the carburetor removed, a metal tube was connected from the intake manifold to a chamber equipped with a small fan and re-circulating pipes. Here the air current kept the dust in suspension. Check valves in the tube protected against backfire.

The ignition system, induction coil and dry cells were replaced by the regular Ford distributor and a lamp bank of six amperes using 100 volts direct current. The manifolds were removed and the dust fed by hand into the intake valve port. The explosions were regular and frequent. W. A. Noel, Washington research engineer, made the tests.

Racket Idea Saves Restringing

ACTIVE production has been started on a tennis racket that embodies several new and interesting features. The strings can be tightened or loosened at will. The mechanism of the device is contained in the handle and a simple twist is all that is needed to operate it. The object of the new racket is to solve the greatest practical problem of tennis—how to prevent strings from breaking when the racket is not in use. By loosening the strings, shrinkage due to humidity will not strain and break the gut. The balance is not affected by the device in any way.

Fibre reinforces the rim of these new tennis rackets.

Invents Hourmeter to Time Hops

THROUGH an electrical contact attached to the landing gear, the recently invented hourmeter timing device records trip and total flying time the moment the plane leaves the ground. The same contact stops the clock when the landing is made. Spreading and contracting of the landing gear actuates the electrical circuit. Current is supplied by two dry cells, or from the ship's battery.

Aeronautical experts declare that this instrument will fill in one of the gaps of aviation.

Current from dry batteries operates the new hourmeter which records trip and total flying time.

"Cross-Eyed" Headlights Throw Beam Around Corner

HEADLIGHTS for your auto that brighten the corner before you get there have been put on the market by a well-known German firm. These "cross-eyed" lights are so synchronized with the steering gear that when the car is turned the outside light swings in the same direction, thus immediately illuminating the new route, and reducing the risk of an accident at the corner.

In the meantime the light on the inside of the turn points straight ahead, lighting up the road directly ahead. In addition to better illuminating the road, the swinging light will warn motorists approaching the turn from the opposite direction.

The outer light illuminates the new route while the inner lamp shines directly ahead of the car.

Loud Noise Disturbs Digestion

MR. E. L. SMITH, of Colgate University, has recently conducted experiments to determine the stomach's reaction to loud noise. Small balloons connected to a registering apparatus and placed in the subjects' stomachs revealed that loud noises caused the stomach muscles to either contract or relax. In either case, however, the momentary interruption of the digestive function was followed by increased muscular activity.

Parking Space on Downtown Roof Solves Montreal's Traffic Problem

IN MONTREAL, as in most of the larger cities, "Where to park?" has become the question of the hour—whether the hour be day or night. This recently constructed four-story building, with a specially reenforced roof, special elevators and interior driveway, partially solves the problem by supplying parking space for 100 cars.

Elevators link street-level arcade to this reenforced roof which has a capacity of one hundred cars.

The Georgias Special is a slightly larger monoplane than we have run before.

The Design of the GEORGIAS SPECIAL

Here's a ship that is larger than usual, but which will perform well with a Lawrence Hickman conversion with two-throw crankshaft.

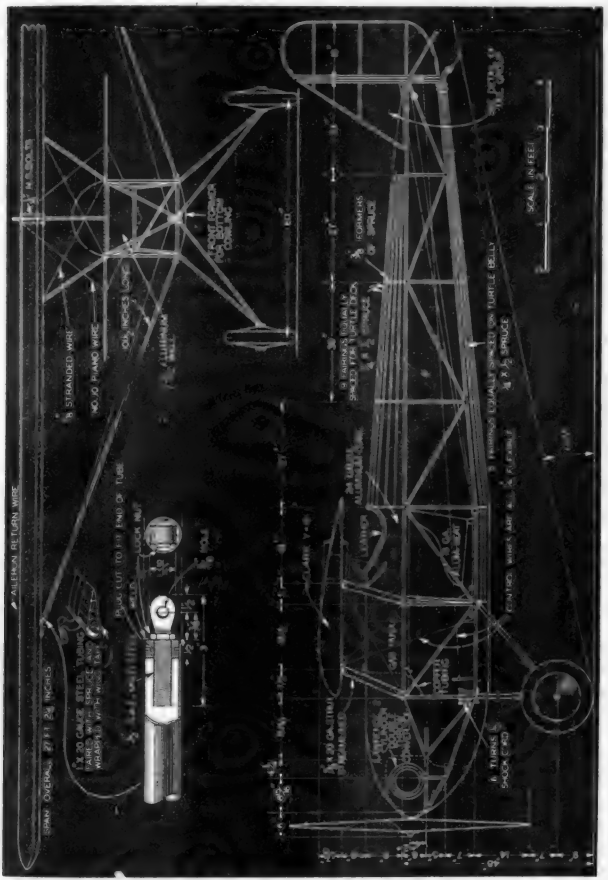
by **ORVILLE HICKMAN**

WELL, here we are boys—with something a little advanced. I expect that you have been waiting for some time for this kind of a plane to build; all steel but the wings, and they are of the conventional wood type.

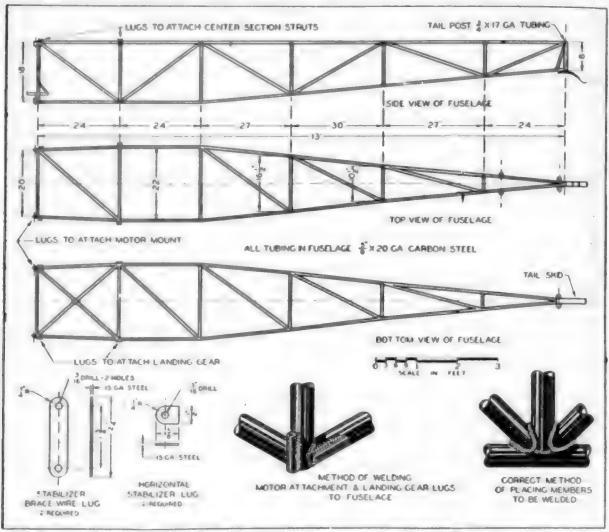
The first thing we will start on is the fuselage. It is rather simple when we know how to go about it. First get your tubing that you are going to use for the longerons and then lay a plan of the side of the ship out on some level surface, preferably a wooden table so that you can drive nails around your outline to lay the tubing into. This work of laying out the fuselage side on the table must be very carefully done or our good intentions are defeated before we get very far. After we get the side laid out we put the pieces of tubing into the outline that we have made and cut the vertical and diagonal pieces to fit. All joints must fit closely and neatly, otherwise we will have to use an undue amount of welding rod to get the holes filled up. This does not make as strong joint.

When all of the pieces are laid, get a welding outfit and if you are not a good welder get some one who is and just "spot" the joints all together with the welding rod —not too much—then make the other side. It is the same so you can use the same jig. After you have completed the second side take out the side and draw another diagram of the top of the ship on the table and drive your nails in. Place the two sides on that outline, with the top longeron down and the vertical sides perpendicular to the table. Be sure that these sides are straight up and down. The best way to assure that is to use a carpenter's square. After plumbness is determined cut your pieces to fit horizontally and tack them to the sides with a torch. Also put in the cross bracing on the top and bottom and the internal diagon-

Profile and Front Elevation Show Pretty Ship of Steel Construction



From these drawings one makes the full size drawing for the layout so the fuselage can be welded.



Here is a more specific drawing than the one on the preceding page. It shows the side, top and bottom layouts for the fuselage members. Note the manner in which the lugs are welded on.

als and all other bracing that the plans call for.

Now the fuselage is ready to take out and weld. The best plan to do this is to weld one bay at a time going around the fuselage laterally a joint at a time. You will find this method the best, having the least amount of warping.

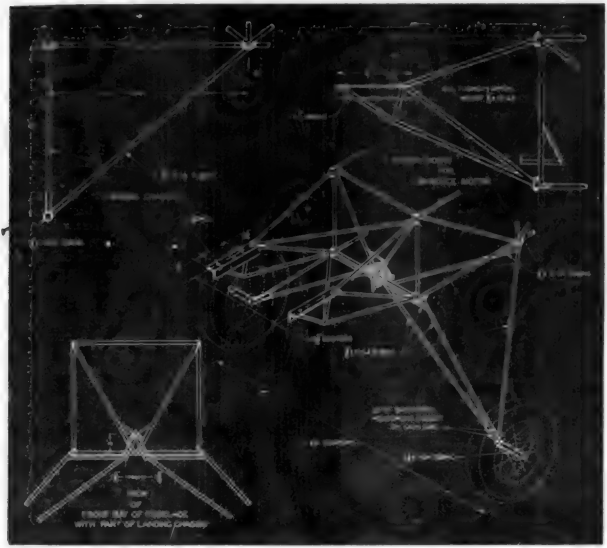
After this operation is complete cut all of your fittings that go on the fuselage and then weld them on in their respective places. motor mount lugs, landing chassis lugs, and so forth.

Special care must be used here for all things must have the exact measurement. Otherwise the parts that fit these lugs will not go on if "out" any. After the fuselage is all welded and the lugs welded on, then give it a painting of lionoil, which protects it from rust.

Empennage

The next thing is to build the empennage, which is a rather simple procedure. First thing to do is to get the outline laid out on the same table that we used to lay out our fuselage, and cut the tubing to fit and spot this the same as you did the fuselage. Take out the spotted framework and weld up. When you have all of the empennage welded, put the control horns on to the elevators and rudder in their respective places, making sure that they are exactly in line.

You will find that the empennage will warp considerably in the part that the light tubing is used, but with a little careful checking and lining up by hand, bending cold (for there is only slight bending to be done) you will get a perfect job. But let me tell you here that there is a little

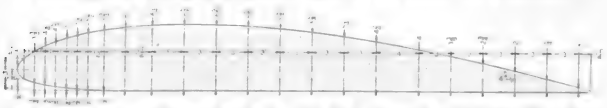


The Cessna type undercarriage is one of the most simple types of landing gear to build, as well as being the easiest of the split types to keep on a ship. The drawing will give you a good idea of how the motor mount is lined up.

trick to heating a steel tube in the proper place to get the right results. That is, heat the tube on the side that the bend is to a dull red. At first this actually increases the bend but when the tubing cools off you will find that it has assumed an angle opposite to the original bend and almost invariably comes out exactly straight.

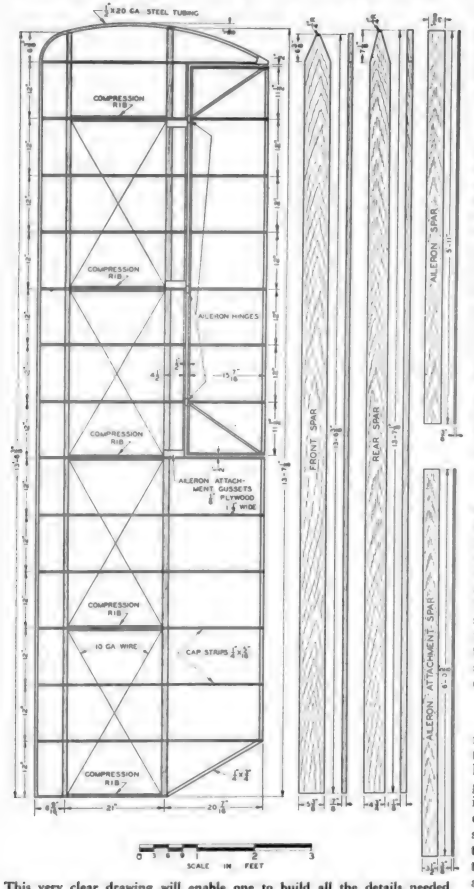
In handling small gauge tubing extreme care must be used not to get this metal too hot and burn the tubing because it is a very easy thing to do and, of course, might cause disastrous results after the ship is flying.

The best way to tell if the weld is good is as follows: the weld must be good, clean metal, looking as though new metal had been placed there. A poor weld has a sand effect on the outside, or is very scaly. If



Here is the accurate, scaled layout chart for the Clark Y-15 wing used on this ship. These dimensions are taken from the full sized ship and are accurate within close practical limits.

Here Is Complete Drawing for the Wing and Spars



This very clear drawing will enable one to build all the details needed for a successful wing panel. Note the method of aileron placing.

any of these faults show up it is always best to throw that piece away and build a new piece. It will cost more, it is true, but nevertheless it is always best.

Fittings

This work is also another very important part of the work. All fittings are designed to be cut out of sheet steel and not more than one bend must be made in these fittings before they are used on the ship. The wing fittings should be installed upon the spars before the ribs are slipped on. Extreme care should be taken in cutting and boring the holes, for these fittings are a very vital part of the airplane.

Landing Gear Lugs

These lugs are made of three-eighths by sixteen gauge steel tubing. They are welded on the lower longeron at the first and second bay of the fuselage and are securely welded to the longeron in line to the landing gear struts and in reference to the longeron.

Motor Mount

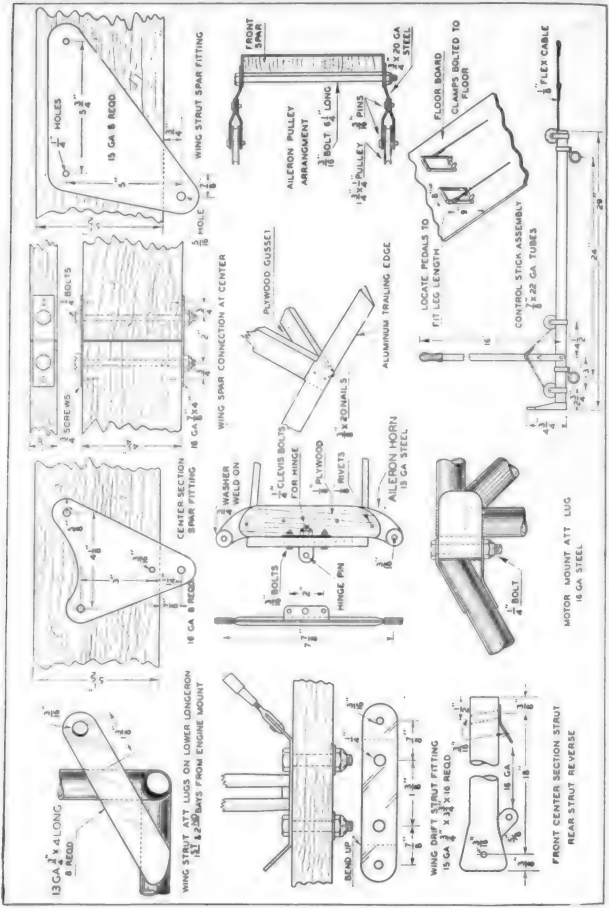
The lugs for the mount are welded to the front end of the longeron and for greater safety are reinforced with a piece of 16 gauge sheet steel passed around the lug and welded to the horizontal tube and the longeron. This mount need not

Powered With a Lawrence Engine, This Pretty Little Ship Flies Nicely

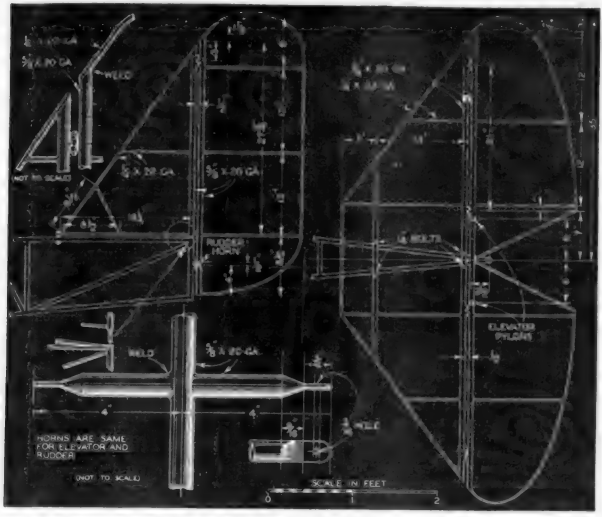
STANDING BY THE TAIL OF A TWELVE-PASSENGER MONOPLANE, THE RAKISH LITTLE GEORGIAS SPECIAL PRESENTS A STARTLING CONTRAST IN SIZES.

In action the Georgias Special is reminiscent of the new Boeing high wing fighter. It flies strongly with the Lawrence, providing the motor is turning up properly, and the standard Lang prop is used.

This Sheet Covers All the Necessary Details for Building the Georgias



Here Is a Blueprint of the Tail Group, Showing Complete Details



Orville Hickman, author of this article, tells how to manipulate the fine tubing so that it will not bend or warp. Notice how the horns are made. Simple, eh?

be made demountable unless the builder likes, but in case you do want it this way, cut out the straps which fit over the ends that are to be supporting tubes of the mount and drill the correct size holes; then the mount is bolted to the lugs that were welded there for same. Next lay out the mount on the table and spot it as you did the other metal work, then place each respective half on their respective places and block up and get lined up and spot the cross bracing in place after all of the members are placed in. Then weld up the mount.

Tail Skid

This part of the ship is a small spring that can most generally be secured in a junk yard where there are some old buggies to pick from, but if not procurable there, make one from spring steel 3/16"x1¼" shaped as shown and placed at the extreme rear part of the lower longerons. The skid is secured to the longerons by two ¼" N.S. bolts.

Instrument Board

This is made from a piece of plywood ¼" thick and cut to fit under the cowling. The form should first be secured by cutting a paper pattern, and then using that to cut the correct form on the plywood. Next, the exact size of the holes for the instruments can be cut by an expansion wood bit. The cowling is clamped by small aluminum clips to the vertical and to the horizontal tubing the same way.

Fuselage Fairing

On the side of the fuselage the fuselage fairing is secured by drilling a small ⅛" hole opposite each tubing that the fairing passes and wrapping heavy cord through

(Continued on page 190)

Fire Hazard Shown as Greatest Risk in Rocket Flight

Although the tail of the Espenlaub rocket plane was covered with asbestos, the intense heat from the rockets set it on fire.

HANS ESPENLAUB, the well known German pilot, who has been conducting experiments in the use of rockets for propelling airplanes independently of his countryman, Fritz Von Opel, missed death by a narrow margin when his first rocket plane caught fire on its initial flight.

Espenlaub's plane took off from the ground by being towed behind a motor-driven ship. When he had reached a height of 135 feet he cut loose and exploded his first rockets, which hurled the plane almost vertically several hundred feet through the air. Although his tail assembly was covered with asbestos it caught fire from the tremendous heat of the rockets, forcing the pilot to glide rapidly to a forced landing. In spite of this misfortune the plane demonstrated that rockets may be used for propulsion when a few more "bugs" have been ironed out.

Meter Registers Light Intensity

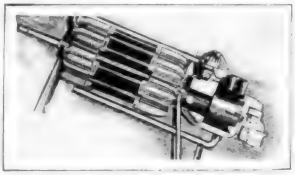
WESTINGHOUSE engineers have recently perfected a light intensity meter which removes photographic lighting from guesswork to an exact science. The new photometer is of the same value to the camera man as the slide rule to the engineer, and insures quick reading of light by a yard-stick method as simple as the volt meter determines electrical energy.

One of the moving picture directors advises that while filming one of the latest features he was checking the light reflected from an actor's face and the meter picked up the change in illumination caused by this man lighting a cigarette.

Sensitive photo electric cell picks up light intensity and causes it to be registered on meter dial.

Aero Engine of Radial Design

SOME of the most revolutionary features of aero engine design have been embodied in this radial air-cooled Franklin aircraft engine which produces 400 horsepower with a total weight of only 375 pounds, including starter and generator.



Although but eighteen inches in diameter, this radial air-cooled engine develops 400 horsepower.

The motor itself has a diameter of only eighteen inches, while the exhaust pipe brings its total frontal area to less than two feet diameter as compared with sixty inches of other radial motors of the same power.

New Auto Salesroom Built in Tiers Displays 300 Cars

THE latest innovation in the automobile selling business comes from Paris, where a distinctly unique salesroom has been built that enables the salesman to display from one point all the automobiles that he has for sale. The entire salesroom is built in five tiers, as shown in the photo at the right, in the form of balconies, on which about 300 cars can be exhibited. The tiers are built of reinforced concrete with metal skeletons, and the entire showroom is decorated in cream with black pillars supporting the balconies. The whole structure gives an impression of lightness and immense height.

From any point in salesroom all cars are visible. The cars are Citroens, known as the French Ford.

Booze Foe Image Opens Bottles

Corked or capped bottles opened with this device.

THE inventor of the combination bottle opener and cork screw, "Old Snifty," shown in the photo at the left, must have had a strong sense of humor, for he puts the image of the advocates of prohibition to work at setting the much-hated joy-water to flowing. The nutcracker chin and nose form the bottle opener, while the cork puller projects from the rear. The whole device is made of metal.

Running Water Keeps Milk Cool

A BARREL milk cooler which uses running water instead of ice as the cooling agent is used by a dairyman in Muncie, Indiana, for storage of milk waiting for the morning milk truck. The milk can is placed in the water-tight barrel.

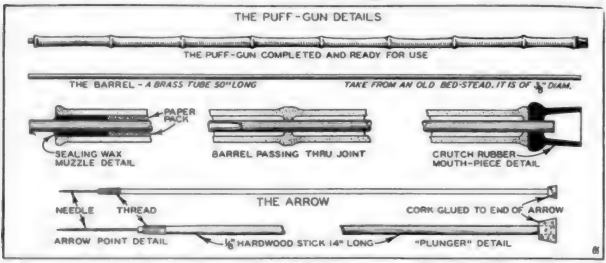
Running hydrant water through barrel cools milk.

Paddle Wheel Canoe Run by Foot

SOMETHING unique in the line of water sports equipment is the side wheel canoe, shown in the photo at the right, an invention of Charles Robinson, a member of a New York canoe club. The "Clermont 2nd" is powered by foot pedals geared to the paddle wheels and develops as high as 15 h.p. A speed of 4 m.p.h. can be attained by a strong-limbed engineer, who also serves as navigator.

Foot pedals power this canoe side-wheeler.

Make Yourself a Set of Real Hopi Indian Puff-Guns



A few simple tools and attention to these few details are all you need to make this interesting gun.

With a little practice you can blow arrows through this gun into a five-inch circle at 10 paces. Wholly aside from the amusement and skill, it strengthens lungs and chest muscles. The arrow flies swiftly and has a surprisingly flat trajectory. Drop in 50 feet is usually less than 6 inches.

GET a straight piece of bamboo about 1¼ inches in diameter and 4 feet long. Each end should be cut through a joint and the ends filed smooth and square. An old brass bedstead will furnish a piece of tubing 50 inches long. If a seam runs down the side so that air escapes, solder it up. If you run into difficulties, you can get a piece of seamless tubing from a light fixture house for a few cents.

Heat one end of the tube and burn a hole through the joints and run the tube through the bamboo so that each end protrudes a little. Next pack paper about the tube from the second joint half way to the muzzle end. This can be done with a wire. While in an upright position pour melted sealing wax (not paraffin) about the pipe on top of the paper until the space has been filled. This is shown in the muzzle detail. The wax holds the tube securely in place and will not soften under ordinary temperatures.

Carefully make a hole through the exact center of the solid end of a crutch rubber just a little smaller than the tube.

Put the rubbers in position as shown in the mouth piece detail. Place your hand over the muzzle end and blow. If there is no leakage, your gun is ready. As a last precaution, squint through the barrel and see if it is straight. A gradual curve can be remedied by removing the wax, sliding the tube out and bending it until the center is about 1-inch off center. Care should be taken not to kink the tube. With the bend of the tube reversed to the bend in the bamboo one should neutralize the other.

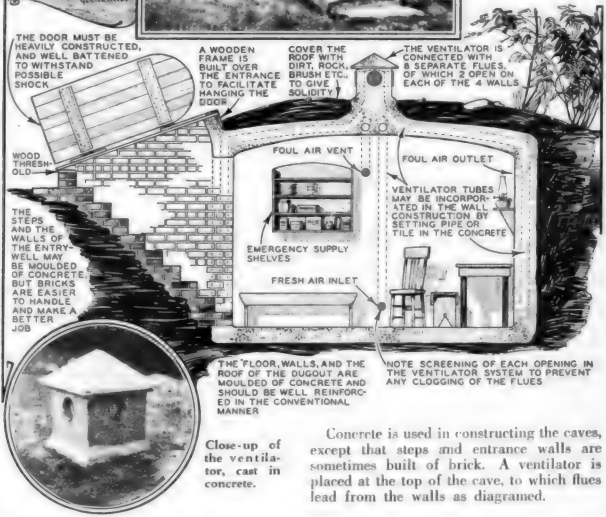
For arrows, use thin round hardwood sticks not over ⅛-inch in diameter, 14 inches long. In some cases, dried cat tail stems will do though they will usually have a bend in them.

Thick, short needles are used for points. Heat them hot and let them cool slowly to remove the temper and prevent breakage. Later heat the eye end and push it into one end of a shaft. This should set in about ¾-inch. When the hole has been burned deep enough, remove the needle, let it cool, then smear it with good liquid glue and tap back in place. Wrap with a number of turns of thread after the front end of the stick has been dressed down with sandpaper to the shape shown. If the thread is rubbed with glue, the ends will not come loose. Thread prevents the end from splitting. The other end of the arrow is provided with a small piece of cork. These corks must be shaped by hand. They should be not over ¼-inch thick with the front end about ¼-inch in diameter and the rear end a little larger—in fact just small enough to pass into the brass tube without rubbing so that a light puff of air will send it through the barrel quickly

Construction of Storm Caves Is a Profitable Profession

LOOKING around for a standardized construction job on which he could specialize, a Nebraska mason hit upon the idea of building underground storm caves for the protection of school children in his section of the Mid-West, where tornadoes are frequent. The drawings show the type of cave he has standardized on, and which has been the foundation for a profitable business. He has built more than 1400 of these caves, finding them not only useful for tornado protection, but popular among farmers as storage pits for vegetables and similar farm products.

Entrance to the storm cave is well shown in these photos, the one at the left also showing a view of the top ventilator.



Close-up of the ventilator, cast in concrete.

Concrete is used in constructing the caves, except that steps and entrance walls are sometimes built of brick. A ventilator is placed at the top of the cave, to which flues lead from the walls as diagramed.

HOME WORKBENCH

Edited by

A. NEELY HALL

As author of such well-known books as "Carpentry and Mechanics for Boys," "Outdoor Boy Craftsmen," etc., Mr. Hall is nationally known as an authority on handicraft subjects. This department appears here regularly each month.

Outboard Motors Make Stationary Engines, Drive Cars

OLD types of outboard motors, too heavy to drive present-day boats, can be converted into stationary engines or applied as power sources for pushmobiles. The power head of such motors is usually in good condition; all you have to do is scrap the under water parts. You can use the muffler just as it is by turning it half a revolution when the motor is used vertically, but an adapter for the intake valve will be needed, as shown, it being necessary to get a 90 degree turn to the intake. To do this, whittle out a little pattern and make a small core for it.

A new base, shaped from sheet metal as shown in the drawing, will be needed. A five gallon gas can with the lower intake fastened to the under side of the motor water jacket and the upper rising to the top of the can will furnish a water reservoir to do the cooling. On the last two cylinder lugs you can put strap iron brackets to support a small varnish can for the gas tank. The drawing below suggests an application of the motor to driving a toy pushmobile. A chain drive, using an old bicycle gear procurable at any second hand shop, is the simplest method of harnessing up the power.

If the motor is to be used inboard in a boat, the best cooling arrangement is to use scoops for forcing the water through the engine. A water pump is unnecessary. The drawing gives a good idea of how the water chamber is hooked up with the motor in stationary use. Such a motor makes a good engine for pumping water.

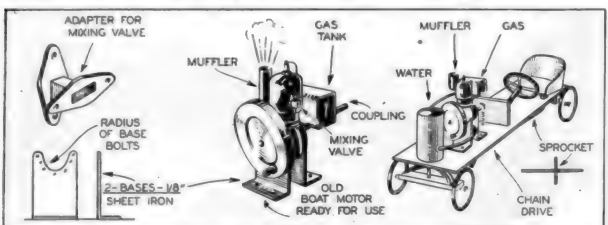


Diagram above shows how outboard motor of obsolete type can be converted to drive a pushmobile.

Hurdles Train Footballers to Develop Running Stride

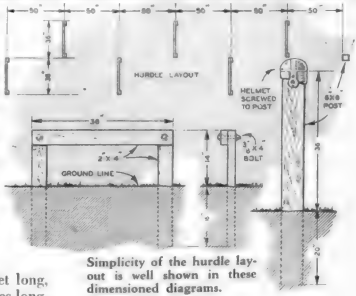
Football candidates learn fine points of running with these hurdles.

AMONG several pieces of unique apparatus which Coach Dick Hanley has devised and built at Northwestern University are the hurdles shown in the photograph. The value of these is in developing the squad's stride—short steps, long steps, and side-stepping. The diagram shows a layout of six hurdles. The photograph shows double the number.

This practical apparatus can be added to any team's training equipment at the expense of a few 2-by-4s and bolts. A piece of 2-by-4 8 feet long, and two ¾-inch carriage bolts 4 inches long, with washers, are required for each hurdle. Buy stock that has been surfaced four sides. Make a templet of cardboard, by which to locate the bolt holes, that they may be bored in the same positions in all pieces. This will save matching ends when assembling. Give all parts a coat of wood stain, paint or lacquer.

A post-hole auger will simplify the work of setting up the hurdles. Stake out the positions, following the diagrams. Drill the holes 16 inches deep. Set the hurdle uprights in the holes. Plumb and line up, and level the bars. Fill in earth around the uprights, add water, and tamp until firm.

The dummy shown in the photograph and in the plan is a 6-by-6 post 4 feet 8 inches long, with 20 inches of its length set into the ground. The post top is padded with upholstering hair, then covered with canvas, to make a good fit for the helmet.

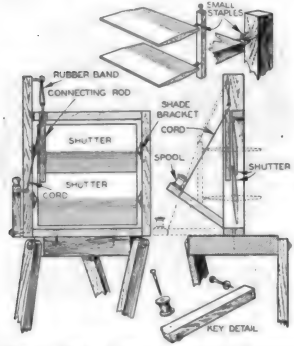


Simplicity of the hurdle layout is well shown in these dimensioned diagrams.

Handy Play Box for Toys

A PLAY box to hold the youngster's toys can be easily built from a few stray pieces of lumber, or perhaps by adapting a box which you can obtain from your grocer. Wheels can be added, but it is recommended that casters of the ball bearing variety be employed. These can be purchased for only a few cents at any department or hardware store. Such a box can be moved easily from one room to another, serving as a storage box when not in actual use. It is advisable to lacquer the box in some appropriate color.

Heliograph Uses Sun to Flash Morse Code Messages



Showing details of shutter mechanism by which dot-dash signals are transmitted by heliograph.

HELIOGRAPHING is an old method of signalling practiced by the army, forest rangers, boy scouts and other groups in the field, and it is recommended as an effective means of communicating at a distance. The apparatus, known as a heliograph, is a simple rig, as you will see by the plans for a home-made model. There are two parts to the apparatus. First, the sun reflector and sighting device, and, second, the transmitter. Each is mounted upon a tripod.

A mirror about 6 inches by 9 inches in size is needed for the sun reflector. To prepare the mirror for the reflector, remove the backing, locate the exact center of the mirror, and scrape away the silvering at that point to make a peep-hole about ⅛-inch in diameter. Cut a hole through the mirror backing that will come directly over the peep-hole, then replace the backing for protection to the silvering.

Make the mirror support of three pieces of 1-by-2, cut of the right length to accommodate the mirror frame with sufficient clearance. Brace the corners of this support with a pair of iron angle braces, as shown, and bore a 3/16-inch hole through base strip for a bolt pivot. Mount the mirror upon screw pivots. Two pairs of shade brackets of the form shown, fastened to opposite sides of the pivot holes in uprights, make excellent bearings. Drive the pivot screws into the exact center of the mirror-frame ends, which must also be in a direct line with the mirror peep-hole. Drive home the pivot screws so that the mirror will hold any position to which it is adjusted.

Mount the mirror support upon the end of a base board about 6 inches wide and 11 inches long. Draw a center line upon the upper face of the board. Bore a 3/16-inch hole near one end of the center line, for the mirror support bolt pivot, bore another hole 4 inches from this hole for the tripod bolt pivot, and cut a ½-inch square end notch for the sight rod. Nail a batten to the edge of the base board, and drive a screw-eye through the batten, for a set screw to hold the sight rod in adjusted positions.

Make the sight rod of a stick ½-inch square and 9 or 10 inches long. Drive a nail into the upper end and file off the head. Then cut a focusing disk out of a piece of tin of the shape and size shown, and pivot its shank to the sight rod with a small screw or nail, so that the center of the disk will be in line with the point of the nail when the disk is swung up into a vertical position.

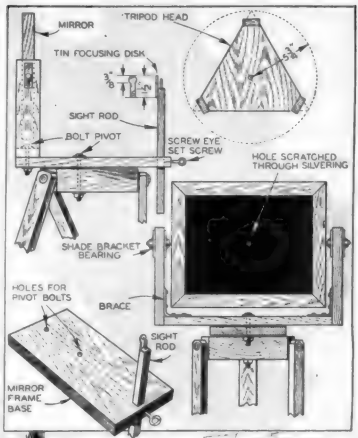
A camera tripod can be used for a support for the sun reflector, but, inasmuch as you must have a tripod for the transmitter also, it will be better to make two tripods and have them alike. The diagrams show a simple home-made model. Lay out the tripod head upon a piece of 2-inch stock, saw off the corners, and bore a 3/16-inch hole for the pivot bolt. Make the tripod legs of strips of 1-by-2, 4 feet long. Bevel off the tops and bore for 3/16-inch screws. Taper the lower leg ends to about ¾-inch square, drive a nail into each, and file off to a point. The nail points prevent the tripod legs from slipping.

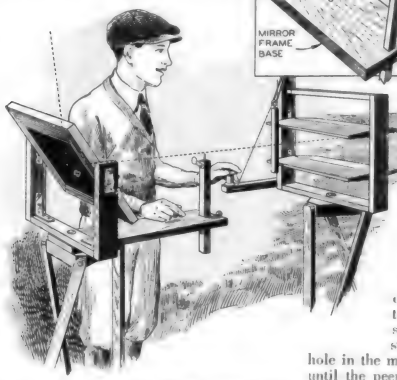
Now for the transmitter. Make a frame of 1-by-2 strips, cutting these of the right lengths for the inside opening to be about 8 inches square, and for upright to project about 3 inches above the frame. With the frame assembled, screw base strip to the head of one of your home-made tripods. Next, cut two shutters from a piece of ½-inch board. Make them of the right width to overlap when mounted, and of the right length to allow for clearance between shade-bracket bearings. You can bevel the edges

of the shutter boards or leave them of full thickness.

Make the shutter connecting rod of a strip ⅜-inch square and 5 inches long, and fasten it to one edge of each shutter by means of double-pointed tacks. Drive one tack into the edge of the shutter, interlock the tack with a second tack and drive this into the connecting rod.

To complete the mechanism for operating the shutters, drive a screw hook into the top of the connecting rod, and another hook into the upper end of upright. Slip several rubber bands over these hooks, using bands of a length that will hold the shutters closed. Tie a piece of cord to the shank of the connecting rod hook, and run this down to the transmitting key. Make





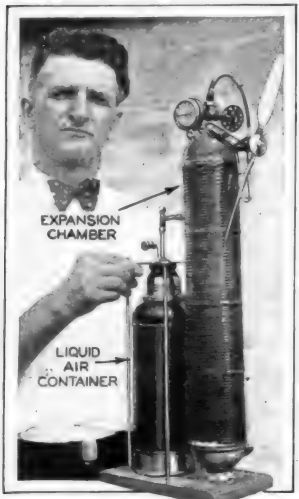
Mirror mount, tripod design, and focusing disk arrangement are made clear in the above diagrams, while the drawing at left shows the completed heliograph in operation.

the key arm of a strip ¾-inch square and 7 inches long, drill one end for a screw pivot, and screw the strip to the outer face of frame upright. Screw a small thread spool to the free end of the key strip, and drive a screw-eye into the side edge for the attachment of the operating cord.

You will want to finish the heliograph apparatus to make it look like a real job. I suggest that you use lacquer rather than paint or enamel, because it dries more quickly, and is not likely to gum up parts.

To set up the heliograph for operation, stand the sun reflector tripod with mirror and sightrod in line with receiving station. Look through the peep-hole in the mirror, and adjust the sight rod until the peep-hole and the nail point line up with the receiving station. Then stand the transmitting tripod in front of the sun reflector. The next step is to catch the sun's rays upon the mirror by turning the mirror. The mirror will then reflect a panel of sunlight, with a small spot in the center caused by the unsilvered peep-hole. This spot must be focused upon the focusing disk. First, raise the focusing disk, so that it centers upon the sight rod point. Then adjust the mirror until the peep-hole shadow is focused upon the disk.

Claims Liquid Air Future Fuel for Airplane Motors



Expansion of compressed liquid air in chamber causes turbine to revolve. The speed of motor is regulated by the turning of a single valve.

VALENTINE NEWBAUER, a Los Angeles aeronautical engineer, has perfected a process which substitutes liquid air for gasoline as a motor fuel. A completed one-horsepower model engine weighs only half a pound, and the inventor claims that an airplane using a full-size motor of this type could fly indefinitely without refueling. The liquid air is carried under pressure in a tank, and when released in the expansion chamber turns the propeller with a turbine arrangement. The speed of the motor may be regulated at will by a valve which regulates the flow of fuel to the expansion chamber. Lubrication problems are reduced to a minimum, while no cooling system is needed.

Cowl Lamps for New Ford Cars

A CHROMIUM plated cowl lamp which harmonizes with standard headlights is another accessory for Model A Fords. To install it is only necessary to drill a 5/8 in. hole and place one nut and lock nut.

Mechanics' Handy Combination

THIS pocket combination tool, made of polished aluminum and weighing but two ounces, has many uses among which are right and left hand bevel, plumb and level, compass and square, and inside square and a depth gauge. A rule which is furnished may be attached with thumb screw, making a "T" square or sliding scale.

Highest and Lowest Highways

THE highest concrete pavements in the United States are the streets of Manitou, Colorado, at 6,440 feet elevation. The lowest is the road along the Salton Sea, in Imperial county, California, which is 150 feet below sea level.

Oil Gauge Is New Ford Accessory

AN accurate oil pressure gauge designed to attach to the instrument panel of the new Ford cars by using two screws already installed, has been produced by an eastern manufacturer. The gauge can also be fitted to Model T cars.

Outboard Motor Powers Novel Ant Exterminator Device

THE automatic poison blowing device shown in the photo at the right might appear on first sight to be one of the intricate inventions of Rube Goldberg, whose amusing contraptions are known throughout the country. But it isn't. It's the invention of an enterprising young South American, and is designed to blow poison down into antholes. The outboard motor, supported by a tripod arrangement, is belted to a blower fan which blows poison powder out of the nozzle. In this manner the most inaccessible depths of antholes can be reached, and the work of exterminating the insects can be carried on easily. Wheels can be placed on the frame to make the device portable.

An outboard motor belted to a motor sprays poison powder through the nozzle into antholes.

English Make Lightest Life Boat

TO a far-seeing British inventor goes the honor of devising the lightest life-boat yet produced. It is so constructed that a woman can easily handle it, as shown in the accompanying photo. The boat is substantially constructed, and capable of carrying two persons comfortably, and three in an emergency. It is made of heavy, waterproofed, specially treated canvas designed particularly for pontoons of airplanes. It was on display at a recent marine exhibition.

Light weight is the feature of this life boat.

Strange Objects Rained From Sky

FISH, salt, dead birds, hay, pebbles, live frogs and toads, shellfish, meat fragments, and a live alligator two feet long are among the collection of objects owned by Ivan Houk, of New York, that have fallen from the sky in rainstorms. It is believed that they were sucked up into the sky during violent disturbances and later let fall to earth. Doesn't someone wish a bank would get caught in a storm occasionally?

Screwdriver Has Non-skid Blade

A NON-SKID screwdriver is something that is often wished for while trying to drive in a screw whose head has become slightly bit up. In the photo at the right is shown a screwdriver with a ribbed blade which takes hold and keeps hold, and thus prevents breaking of heads.

A Bicycle SIDE-CAR

by GENE MORLEY

A bicycle can carry two passengers with ease when fitted with the side-car described here by Mr. Morley. Made of scrap materials to be found around the house, its total cost should not exceed three dollars, and it will last as long as the bike.

HERE is an opportunity to give your friends a ride without imposing any strain on your bicycle. And besides, the balance of the wheel is not disturbed.

The type illustrated here is designed for light weight and low cost. In fact, the original was made entirely of odds and ends found about the backyard, with the exception of the side wheel and axle. Together these cost only $2.90.

Of course, there are such items as bolts and paint, but one usually has these on hand. Any handy boy should be able to duplicate this side-car with hammer, saw, brace and bit and such tools as are found in every home workshop.

For the frame members, use Oregon pine or similar wood throughout, except for the footrest, which is of white pine, and the plywood seat bottom.

Begin with the "backbone," or main frame member. This is cut to shape from a piece ¾ in. by 2¼ in. by 32 in. The central portion, about where it fits over the end of the bicycle axle and nut, is left full width for strength.

The other portions are narrowed down to 1½ in. wide. Bore a hole as indicated to fit over the end of the bicycle axle and counter-bore this hole 1 in. in diameter and about ⅜ in. deep to allow for the hexagon nut on the bicycle axle. Also bore a ½ in. hole at the back end for the side-car axle, and a ⅛ in. hole down through this for a cotter pin to hold the axle in place. Binding the ends of this member with wire will prevent its splitting under strain.

Slot the forward end, as shown, by drilling two 5/16 in. holes about half an inch apart and chiseling out between. This slot permits lateral adjustment of the clamp blocks for various makes of bicycles. Make the clampblocks according to the drawings, drilling them for the screw and bolt holes. An iron bar is used outside these blocks to reinforce the entire unit. The original bar was made by sawing off one leg of an angle-bracket purchased in the ten-cent store. Incidentally, a hack-saw is indispensable all through this job.

For the rear clamp which fits under the V-members of the bicycle frame you may find a piece of iron around the place to suit your purpose, or can pick one up at a repair shop, or even on a well-stocked junk pile. You may be interested to note that the job shown in the photo was made principally from junk—the iron frames from the wreck of a kiddie-car and parts of an expatriated chandelier; a scrap of inner tube, part of a felt hat, a battered strip of galvanized iron sheet and odds and ends of wood. It pays to save every sort of junk, for sooner or later you will find good use for it.

With the main frame-member clamped to your bicycle, it is easy to fit the other pieces. Be sure the bicycle is in an upright position so as not to throw out any calculations.

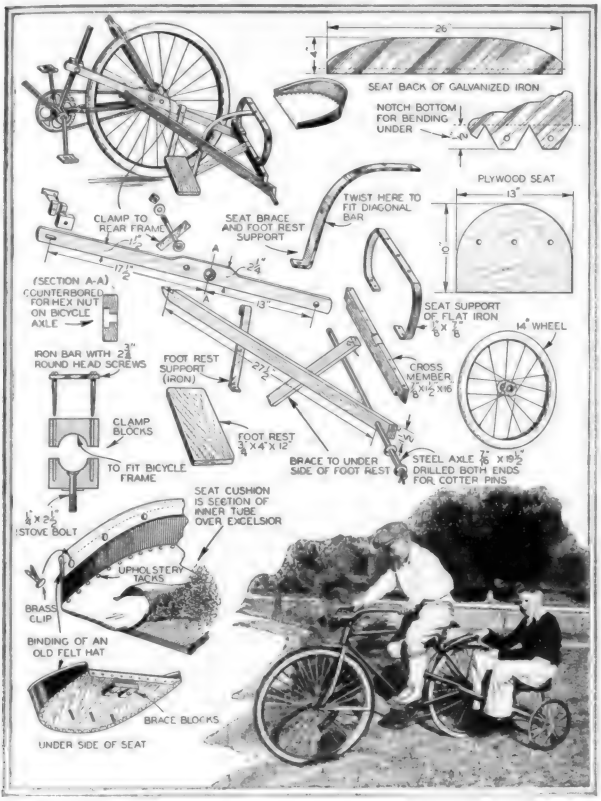
The diagonal bar is made as shown, and with the side-car axle and wheel installed temporarily, the remainder of the fitting is comparatively simple.

Bending the flat iron pieces for the seat support and braces is facilitated by heating red-hot and hammering to shape. However, with a heavy hammer and substantial iron vise it is possible to do this work cold. Drilling the holes in the iron is a job for your garage man.

Plywood was selected for the seat because of its strength combined with light weight. Ordinary material can be used, of course, with very satisfactory results.

The seat back is galvanized iron sheet bent around the curve of the bottom piece and nailed to the underside through the tabs cut for the purpose. Use short nails or upholstery tacks for this job.

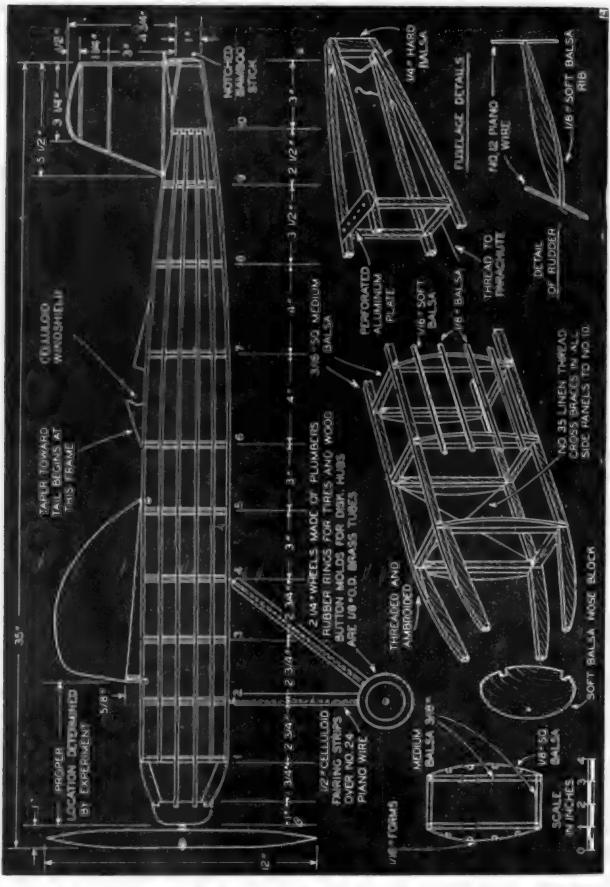
Scrap Materials Can Be Used to Advantage in Building This Side-Car



Before putting on the upholstery remember to insert through the bottom the bolts which are to fasten the seat to the framework. The writer overlooked this and had a fine job on his hands getting the seat covering off again without tearing it all to pieces. A section of inner tube cut to shape and laid over a good grade of excelsior makes a splendid seat. Around the top edge

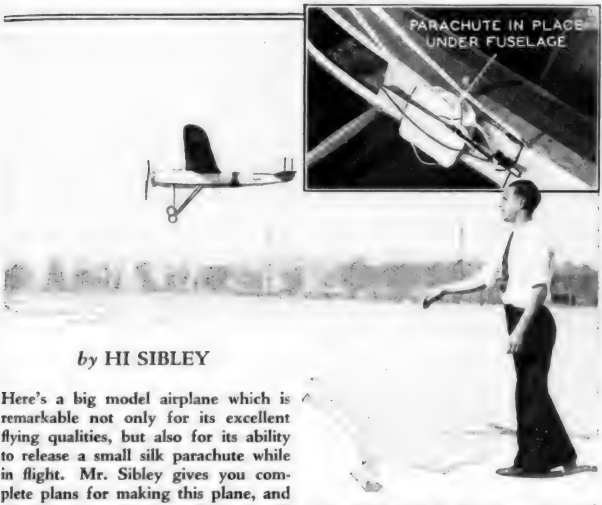
(Continued on page 198)

Fuselage Details of Sixty-Inch Model Presented in This Blue Print



Balsa wood is used in building this light, strong fuselage for which complete dimensions are given.

Model Plane Drops 'Chute



by **HI SIBLEY**

Here's a big model airplane which is remarkable not only for its excellent flying qualities, but also for its ability to release a small silk parachute while in flight. Mr. Sibley gives you complete plans for making this plane, and the blueprints with the article make all construction details clear and simple.

The model plane in the air is as graceful a craft as one could wish for, and can be either hand launched or permitted to rise off the ground. Insert shows details of 'chute release mechanism.

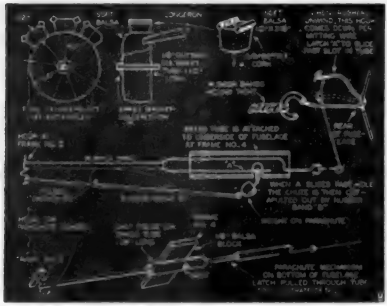
THIS big model, designed and built by Bob McCorkle, of Monrovia, California, is distinguished in two respects—it is a splendid flyer, and just before coming to earth it releases a tiny silk parachute. McCorkle, an aviator himself, has built many successful models and worked out this design with the greatest care.

It can be copied by anyone who has had experience in building first class models. Construction is standard throughout, with care given to keeping wing and tail assembly light in weight. The completed ship, as shown here, weighs about 8 oz., and the 125 flights made prior to taking the accompanying photographs is proof of the sturdiness of its construction. It performs equally well when taking off from the ground or when hand launched.

To build according to these plans, first draw the outline or profile of the fuselage on a flat board, and drive in small brads or pins along the lines to hold the longerons to shape while struts or uprights are ambroided in place. Medium balsa 3/16 in. square is used. While still in the form, install cross braces of No. 35 linen thread in all side panels except at the extreme tail. These threads are drawn taut over the brads, to prevent any strain on the framework, and in this position ambroided to the longerons, etc. When ambroid has set the ends of the threads are cut from the brads.

Next join the two side frames by ambroiding in the cross members. Note that the forward ends of the longerons extend ahead of Frame No. 1, and curved pieces

Parachute Releasing Device Is Ingenious



Unwinding of rubber bands which turn the propeller release the mechanism shown above which launches the parachute.

are bound and ambroided to them to carry the balsa nose or motor block. The latter is of soft balsa, 1 in. thick and 2½ in. diameter, to which the dummy cylinders of cork are fastened with brads and ambroid. The detail drawing shows how they are laid out for the nine cylinders.

Having built up the main frame of the fuselage, curved strips or formers are ambroided along the sides, and four ⅛ in. sq. soft balsa strips fastened lengthwise to these to give the rounded effect.

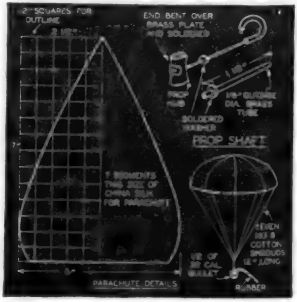
The long wing is laid out in pencil on a flat board, with exact location of ribs marked in, and assembly proceeds much the same as for the side frames. A Clark-Y rib is used, the outline of the central ribs shown in the chart. These are cut from 1/16 in. soft balsa with a razor blade. A ¼ in. by 7/16 in. hard balsa spar, tapered toward the tip, is ambroided in the notches in the ribs, and No. 12 piano wire is used for the curved wing tips.

After ambroid has set, transfer the frame from the flat board to two other boards joined at the center to form about a 6 degree dihedral, bringing each wing tip about 3¼ in. above the center. The spar is first cut through at the center, the wing frame then laid on the dihedral boards and just enough weight laid on top to hold both wings flat upon the boards. Now apply ambroid to the cut in the spar; the leading and trailing edges merely bend to the shape of the dihedral and present a neater job than if broken at the center.

Note the very light construction of stabilizer and rudder. In the former a bamboo leading edge, ⅛ in. sq., and tapered toward the tips, gives great strength. The central section is bent by heating cautiously over a candle flame. Tips and trailing edges are of No. 12 piano wire, which is bent into the shape of an elongated "W" in the center at the tail of the fuselage to engage in a notched bamboo stick for vertical adjustment.

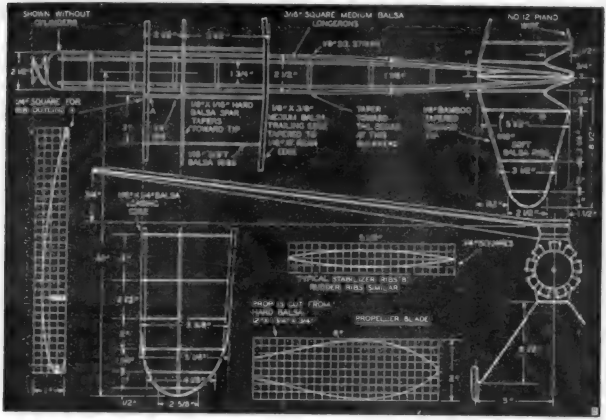
The rudder construction is similar, except that no bamboo is used in the leading edge, this being No. 12 piano wire. Extensions of the wire serve as an axis and also for right or left adjustment at the leading edge, where the tip of the wire is inserted in a perforated aluminum plate on top of the fuselage.

Lay out the outlines of propeller blades on a hard balsa block 12 in. long, 1¾ in. wide and ⅜ in. thick. Saw out the blank and whittle the blades down so that they taper from the hub to about 1/16 in. at the tips. See that the prop is accurately balanced, and that the blades are uniform. Bend the propeller shaft from No. 24 piano



Parachute pattern and detail of prop shaft.

Propeller, Ribs, and Tail Structure Dimensions Given in This Drawing



It is easy to copy off the propeller and rib curves by ruling off quarter-inch squares and tracing off the curves as given above. A number of other essential dimensions are given in the print.

wire, insert through the hub, and ambroid a small brass plate over front of the hub and a copper or steel washer on the back. Now bend the protruding end of the prop shaft over the brass plate and solder in place. This prevents shaft pulling through hub under strain of wound rubbers.

Of course, the shaft must first be inserted in the propeller bearing in the motor block. This bearing is made of a 1½ in. length of standard ⅛ in. (outside diameter) brass tubing, with a flange made of a washer soldered near the forward end.

Landing gear struts are of No. 24 piano wire, bound with thread and ambroided to the fuselage at frames 2 and 4. Wheels should weigh one ounce each to give the proper flying weight and concentration of weight well below the wing center. They are made up of large wood button molds for disks, plumber's rubber rings for tires, and a ⅛ in. brass tube hub. If the holes in the button molds are too large for this size tubing, they can be bushed with short sections of rubber tubing the proper size, the brass hub being ambroided inside the rubber. A small brass washer is ambroided or soldered to the ends of the axles for hub caps, and fairing strips of celluloid are ambroided to each strut for appearances.

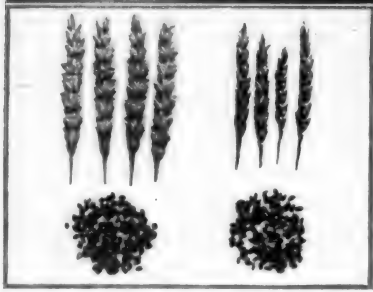
Covering should be put on all frame work before installing the parachute mechanism. Use Japanese rice paper throughout. On the wing frame cover the bottom side first, applying good glue lightly to the two central ribs and bringing the paper taut over them. When dry, put glue sparingly on entering and trailing edges and wing tip. Glue the paper to a point on the tip, drawing it taut and then run the tips of the fingers over the edges, tightening the paper as you go along. Cover the top side in the same manner. It is not necessary to glue any of the intermediate ribs. The same procedure applies generally for covering rudder and stabilizer. Separate sheets must, of course, be used on each side of the fuselage. Give all surfaces three coats of dope cut half with high grade lacquer thinner.

Although the parachute releasing mechan-

(Continued on page 200)

Sulphur Dusted by Planes Saves Wheat from Rust Blight

Here is shown the Huff-Daland dusting plane flying low over the wheat field releasing the sulphur powder which settles on the plants and protects them from the ravages of rust spores.



Improvement in the grade of wheat is shown in the photo above. At left is wheat dusted tri-weekly with sulphur. At right is wheat grown under same conditions but not dusted.

RUST, the parasitic fungus that has long been the scourge of Canadian wheat fields, causing millions of dollars loss in blight and low grade grain, is at last beating a retreat before the invasion of airplanes which spray the fields with clouds of powdered sulphur.

For many years experiments were carried on by scientists at the rust research laboratory at Winnipeg who were seeking to find some means of ridding Canadian wheat farmers of their worst enemy—rust. Tens of thousands of plants were grown in the greenhouses for experimentation and hundreds of fungicides were tested upon the rust-inoculated plants. At last it was found that the riddance could be achieved by protecting the wheat against the rust spores with fungicides, and that sulphur dust was the best protective agent.

Then the Winnipeg laboratory workers decided to test sulphur dusting on a large scale, and they requisitioned an airplane in an effort to combat the aerial attacks of the rust raiders with an aerial counter attack. The Canadian Air Force supplied a Huff-Daland dusting plane, similar to those used in dusting crops against the dreaded boll weevil.

This plane had a hopper capacity of six hundred pounds, an amount sufficient to dust fifteen to twenty acres of land. Flying at one hundred miles an hour, it released the sulphur dust over the fields at an average height of twenty feet.

The results convinced everyone that wheat fields can be protected from rust by means of the sulphur fungicide. One field of 75 acres of Marquis wheat was dusted at the rate of 15 pounds per acre and the yield was 22 bushels per acre of No. 2 Northern wheat. A neighboring field of 20 acres was left undusted to serve as a check, and its yield was 13 bushels per acre of No. 5 wheat.

New Talking Movies Replace Stenographer's Note Book

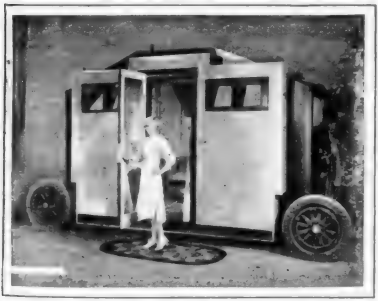
THE movietone principle of recording the human voice has been adapted to office use in a machine which has been named the "Dailygraph." The device is primarily intended for dictating letters in the office but may be used to record speeches for translation or future reproduction for educational and historical purposes. It is a German patent and has been placed on the market in continental countries.

The speaker talks into a mouthpiece similar to that of an ordinary telephone, and the vibrating diaphragm transmits the sounds to the machine in the form of electrical impulses which in turn are converted to light waves. These are recorded on the narrow strip of film similar to that used in the talking movies. When reproducing the voice, the mere pressure of a button reverses the process, and the sound may be projected at will either through the loud speaker or ear phones.

Dictation is recorded on film and may be reproduced at will through sound projector.

Travelling Dressing Room—Movie Star Introduces Her "Dressmobile"

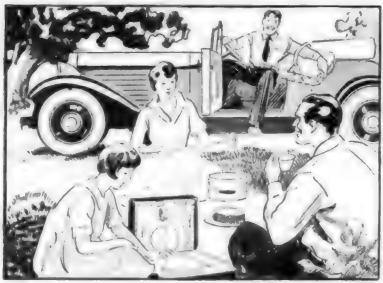
KEEPING temperamental moving picture stars happy and comfortable while on location has long been a serious problem with directors, but Metro-Goldwyn seems to be on the right track in the solution of this problem by providing luxurious traveling dressing rooms for the expensive talent.



Marion Davies is first film star to possess moving bungalow.

To Marion Davies goes the credit for the idea of the dressing room on wheels which may be hitched behind a truck and towed wherever the company may happen to be working. The new moving bungalow has all the comforts of home including an electrical refrigerator, radio set, hot and cold water, boudoir equipment, and complete wardrobe facilities. Deep springs and powerful shock absorbers make riding easy. The running gear may be detached and rolled to the side.

MOTOR MECHANICS



Edited by
RAY F. KUNS

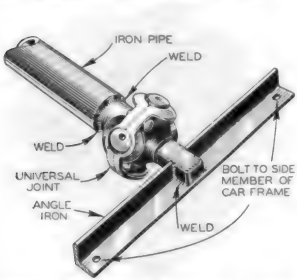
As editor of Auto Digest and principal of the Cincinnati Auto Trades School, Mr. Kuns is well qualified to advise car owners in all phases of automobile maintenance and operation.

Old Universal Joint Makes a Good Hook-up for Trailer

THE problem of attaching the trailer to the automobile in such fashion that the owner of the car will be able to enjoy a contented frame of mind while touring along at high speeds is not a slight one. The hook-up should be practically universal. Some companies make use of a ball and socket type of joint. The car owner who has built his own trailer and desires to get a good hook-up may make use of a universal joint which is in good condition.

Attach one end of the universal joint to a cross member made from a piece of channel iron. Bolt each end of this cross member to the side frames of the car near the gasoline tank. The closer to the body the joint is made the better it will be.

When disconnecting the trailer it will be necessary to remove these two bolts rather than to remove the universal joint or disassemble it. The cross bar and universal joint hook-up becomes a definite part of the trailer.



Universal joint used as hook-up for a trailer.

Hints for Summer Driving

HAVE the radiator cleaned and the cooling system flushed out.

If the car runs too hot and gives evidence of pre-ignition, have the spark plugs checked to see that those in use are not of a type known as a hot plug. The hot plug has a long porcelain skirt within the plug. The cool running plug has a shorter porcelain. Volatile gasoline may be the cause of a high speed engine miss. Where a high speed engine miss is encountered which is hard to locate, it is a good plan to change to a low grade gasoline for a test.

When trouble is encountered with pump packing try to secure some plastic pump packing with which to fill up the packing gland. This, in addition to the regular packing, will make a good job. Do not wait until the fan belt is completely worn out and breaks with the chance of doing the fan or the radiator damage, or allowing the car to overheat and be held up on the road. Fan belts are inexpensive and should be renewed before they are entirely worn out.

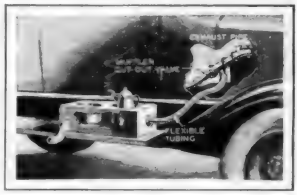
Making an Exhaust Heat Cooker for the Running Board

THE drawing at right illustrates a method of cutting into the exhaust pipe and applying a muffler cut-out valve, so as to provide a take-off for attaching the flexible tubing which conducts the exhaust heat into the cooking unit.

This cooking unit may be made square as shown, with one or more cups of welded sheet steel. Any sheet metal welder can form up and weld a box of this type. He will weld on tubing connections for the head and tail pipe. The cup set into the box should be not less than 6 inches in diameter. The box should be approximately 8 inches wide, and 5 to 7 inches deep. The cups come within one inch of the bottom.

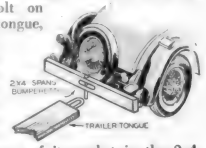
The ingenious workman can make use of this idea in respect to many materials. For instance, he may find in the hardware store some pails which may be fitted together and welded or brazed in such fashion as to form an admirable cooking unit. The main idea is to have a gas tight space around the inner vessel. Soldering will not hold metals together, as the heat is too great. They must be brazed or welded.

A covering which may be made from sheet metal or wood, with asbestos paper lining, is used to protect the cooking unit when traveling. Cookers of this type will boil water almost as quickly as the average stove.



Auto Trailer Connection

WHEN the car is equipped with rear bumperettes, a 2x4 spanning the distance between them, gouged out in the center to admit the tongue of a trailer as shown below, makes an excellent connection. A hole is drilled through for a bolt which fits into a U-bolt on the trailer tongue, holding it securely. The trailer can thus be easily disconnected by simply lifting the bolt out of its socket in the 2x4.

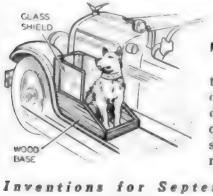


Spark Plugs, Faulty Valve Springs, May Cause High-Speed Missing

NOT a little trouble is experienced with engines missing at high speed, particularly since the use of high compression engines is so universal. Here are some of the causes and remedies: See that the spark plugs are of the proper type—the higher the speed, the cooler running should be the plug, which means a plug with a short porcelain.

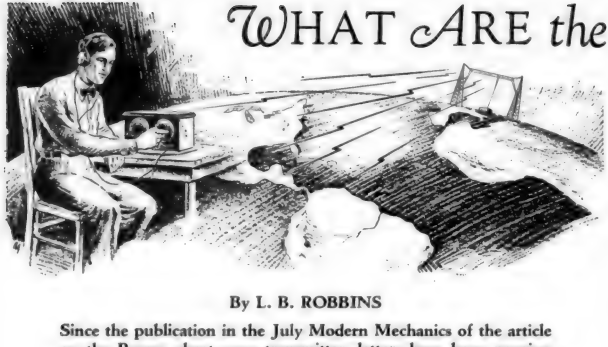
The next thing to look for is spark plug gap, which should not exceed .022 to .025 inches. Next inspect the contact point gap. This should be .017 to .020 inches. Next inspect the valve tappet clearance when the engine is hot. The expanded valve stems may be causing them to hold open.

The heat of the engine operated at high speed may cause the valves to stick in the valve guides. This may be remedied by having the valve removed, and the gum cleaned off the valve stem and out of the valve guides.



Running Board Compartment for the Dog

TOURING is usually pleasant enough for humans, but not so comfortable for the family dog who must cling to the running board as best he may. A running board compartment built after the lines of the one shown in the drawing at the left will provide comfortable traveling quarters for the family pet. The glass windshield on three sides protects the animal from wind, regardless of how rapidly the car may be driven.



WHAT ARE the

By L. B. ROBBINS

Since the publication in the July Modern Mechanics of the article on the Pygmy short wave transmitter, letters have been pouring in requesting plans for building a short wave receiver that can be used in conjunction with this set. Well, here it is! Using this efficient and inexpensive receiver, Mr. Robbins, operator of station W1AFQ, has brought in music and code from everywhere.

MAYBE a lot of you radio fans think you're getting a big kick out of radio by twisting a couple of dials and bringing in a lot of noise from some broadcasting station several hundred miles away. Well, if you do you "ain't seen nothin' yet" in the way of thrills with a radio set.

Down on the lower wavelengths, between approximately 10 and 100 meters, there are things going on that most radio fans either overlook or don't know about. Amateurs to whom radio means more than merely twisting dials on a high-priced broadcast receiver are pulling in programs on these frequencies from the other side of the earth, or—and here's the thrill—actually talking in voice or dots and dashes with other radio fans scattered all over the globe.

With a receiver designed to pick up signals on these wave lengths it is possible for you to listen in on the things going on there. Although as yet there is not as much broadcast stuff on these frequencies as on the standard broadcast frequencies, yet when you do get something it is just as likely to be coming from Australia as from some city nearby. And after a while, when you have learned to interpret the dot and dash signals, you can get on the air with a transmitting station of your own, and talk to other amateurs all over the earth as if they were sitting in your own room.

The accompanying diagrams show an inexpensive two-tube receiver that will work splendidly, both as a receiver of voice and broadcasting, as well as one with which to receive the thousands of "dit dah" messages sent out by the amateur fraternity. It has purposely been kept simple in design, using only the tried and tested parts and tubes, so that the novice can build and operate it successfully. Trick circuits and tubes have been entirely eliminated, and the builder can feel assured that if directions are followed closely this set will *work*.

Here is a list of essential parts needed:

Two 201A type tubes.
Three UX sockets.
Two ½ in. squares of sheet copper or brass.
One 50 mmfd. variable condenser (5 plate)
One 100 mmfd. midget condenser (23 plate)
One 50,000 ohm variable resistance.
Two Vernier dials—one for 50 mmfd. condenser and the other for 50,000 ohm resistance.
One knob for midget condenser.
One audio transformer (10 to 1 ratio if possible).
One single circuit phone jack.
One 1 mfd. fixed by-pass condenser.

SHORT WAVES SAYING?

One 100 mmfd. fixed grid condenser.
One 2000 mfd. fixed by-pass condenser.
One ½ ampere Amperite and mounting.
One 2 to 4 megohm grid leak and mounting.
One 1 megohm grid leak and mounting.
One binding post strip with six posts.
One 11"x6" baseboard.
One dry hardwood hard rubber, or bakelite panel 12"x7".
Sheet of heavy tinfoil or copper foil for shield.
Shellac.

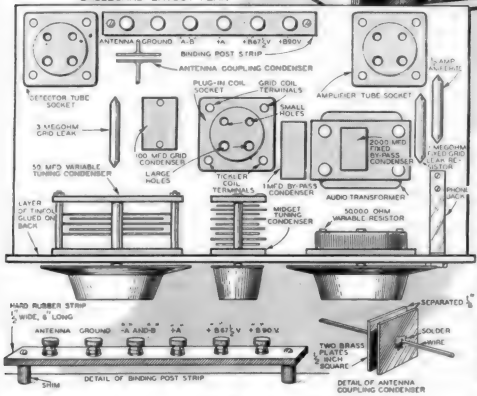


Fig. 1. Place parts on the baseboard as illustrated, and wire up with insulated hookup wire. The antenna coupling condenser is fastened to the board with small angle irons. The resistors are fixed in regular mountings.

Five vacuum tube bases.
Spool of No. 24 DCC magnet wire.
Hookup wire—solder—screws—bolts and nuts.

First drill the panel for the five plate tuning condenser and the variable resistance shafts. Arrange them so the dials will be placed equidistantly from the edges as shown in Fig. 1. Then place the midget condenser between these parts and arrange the phone jack at the lower right hand corner. No measurements are given because of the varying sizes of different makes of parts.

Now before assembling the parts on the panel, shellac it two coats on the back and press on a sheet of heavy foil. When dry, cut away all foil liberally around bolt and shaft holes. Positively no metallic part of any instrument must touch this shield, which is necessary to reduce hand capacity when tuning.

Then mount the four panel instruments in their respective positions and put on dials and knobs. Then fasten the panel to the base by three small screws along the bottom.

Place two of the UX sockets ½ inch from the rear edge of base and about an inch from the ends. Place the remaining socket directly behind the midget condenser, facing the plate and grid posts of the latter to the rear. Mount the audio transformer behind the variable resistance and the 1 megohm grid leak and Amperite at the right of transformer. Mount the detector grid leak between the tuning condenser and the

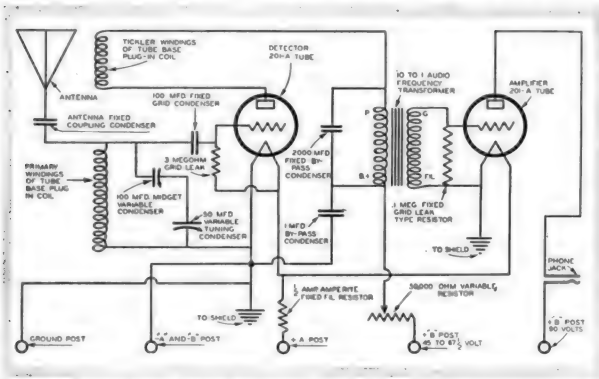


Fig. 2. The receiver is wired up as shown above. Negative legs of filaments are grounded to foil shield. Tuning is done with the variable tuning condenser and the 50,000 ohm variable resistor.

detector socket behind it.

Then place the 100 mmfd. grid condenser near the grid leak, the 1 mfd. condenser between coil socket and transformer, and the 2000 mmfd. condenser across the transformer primary. Mount the binding post strip between the tube sockets, raising it about 1 inch from the base by shims. You are now ready to wire. Use flexible insulated hookup wire throughout, and solder all joints not in binding posts.

Starting at the antenna post solder a piece of stiff wire to the center of each ½ inch brass plate. Secure one in the antenna post. Then place the other plate parallel and vertical at a distance of ⅛-inch from the first and connect this second wire to grid coil terminal or coil socket. This forms the antenna coupling condenser.

A wiring diagram of the receiver is shown in figure 2. The layer of foil on the back of the panel is grounded on the ground post of the binding post strip. The negative leg of the detector filament is grounded to the shield to offset the the body capacity of the hand when tuning. The current to the amplifier tube filament is fed through the shield, to which the negative leg of the amplifier filament is also grounded. The two condensers, the midget and the 5 plate tuner, are hooked in series and shunted across the primary of the plug-in coil as shown.

The plug-in coils are clearly shown in Fig. 3. Remove the glass from an old tube by heating, clean out the base, melt solder from prong tips, and pull out the leads. Then drill out the prongs clean with a very small drill. Coils are wound to conform with the coil socket connections, so do not wind them in any other manner except as herein directed.

Drill four small holes diagonally in the side of base as shown. First wind the grid coil. Scrape an end of the magnet wire and run it through the top hole of the base and down through prong 4. Bend the wire over prong and secure it with a drop of solder. Then wind on the designated number of turns tightly and closely, and push the end of the wire through next hole and down and into prong 3. where it should be

pulled tight and soldered. Start the tickler winding in the next hole down to prong 2. Then wind on and finish through the bottom hole to prong 1. The two sets of windings should be wound on firmly and in the same direction. Finally, carefully file away the excess wire and solder on the prongs so that they fit snugly in the coil socket.

The approximate number of windings for the various wave lengths are shown in Fig. 3. You may have to add or subtract a turn or two to secure oscillation when it comes to the final analysis. The parts used will determine this to some extent.

The coil for the 150 meter band will have too many turns to wind on a tube base, so it will be necessary to bolt a larger form around the base to make a neat job. Separate the tickler and grid turns from each other about an eighth of an inch, but keep the turns of the windings themselves close together.

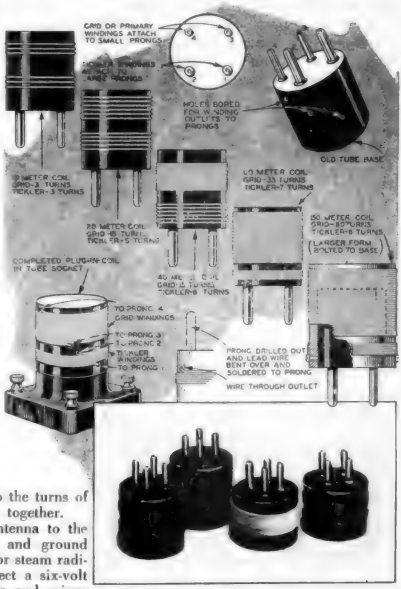


Fig. 3. The tickler and grid coils are wound on tube bases as shown. The units, each covering a different wave band, are interchangeable, and plug into the common socket.

Connect a 40 to 50 foot antenna to the antenna post of the receiver and ground the set to any good waterpipe or steam radiator. Using 201A tubes connect a six-volt storage battery to the A plus and minus posts. The B battery should have 90 volts for the audio and at least 45 for the detector voltage, although 67½ may work best with an old tube. This is reduced gradually by the variable resistor as needed for good regeneration. For 199 tubes, use a 3 to 4 volt storage battery with appropriate rheostat to control tube filaments.

Now we are ready to operate the set. Put headphones in the jack with the usual plug and light the tube filaments. Turn down the 50,000 ohm variable resistor and put in one of the plug-in coils. The 80 meter one is best for a test. Set the midget condenser about ¾ maximum and then slowly turn up the variable resistor dial until a rushing sound is heard in the phones. Then slowly turn the tuning condenser dial at the left until a station is heard. By adjusting the midget condenser you can reduce or increase the wave length coverage of the main tuning dial, so the band can be made to spread well out over the tuning condenser dial. For the higher wavelengths keep the midget condenser well meshed, but for the very low wavelengths open it up to practically a minimum.

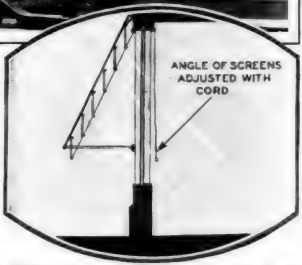
Regeneration is completely controlled by the 50,000 ohm variable resistor, so it is important that this be an absolutely quiet working part. Phone and broadcasting stations should come in with a very gradual building up of regeneration. They should

(Continued on page 178)

New Type Window Awning Operates on Shutter Principle

The window awnings shown above can be adjusted to cut off light or admit any amount desired.

WINDOW awnings which operate like old fashioned shutters, closing out all sunlight if desired or admitting only a small part or all of it, are in use on the windows of a large Hollywood bank. The awning can be faced around in any direction to face the direct rays of the sun, and does not stick out over the walk to knock off hats of passers-by. The shutters are adjusted by pulling the cord, as shown in the photo at the right.

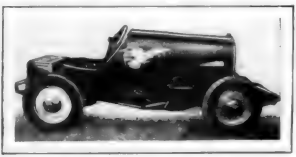


Pulling the cord changes the angle of the screens, which operate like old fashioned shutters.

Motorcycle Engine Runs Small Car

THE small home-made automobile is increasing in popularity throughout the country, and probably before long there will be regular dirt track racing events taking place.

The photo below shows a common type. This one was built by mechanics of the "Eagle Bus Lines" of Greenville, S. C. It is powered with a motorcycle engine.

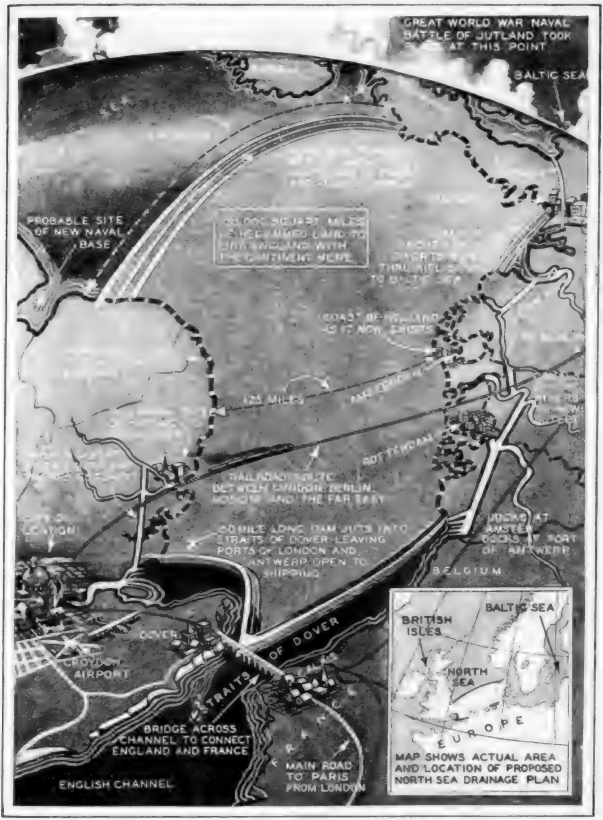


Scientists Doubt Ray Discovery

A DISCOVERY described in European technical reports by terms ranging between a "prodigious discovery" and "a bare faced fraud" is attracting the attention of scientists. A young Italian electrical experimenter has discovered, he announces, a hitherto unknown ray in the ether which he extracts and converts into electric power. At a demonstration, he made an electric lamp burn for hours without contact with any source of power.

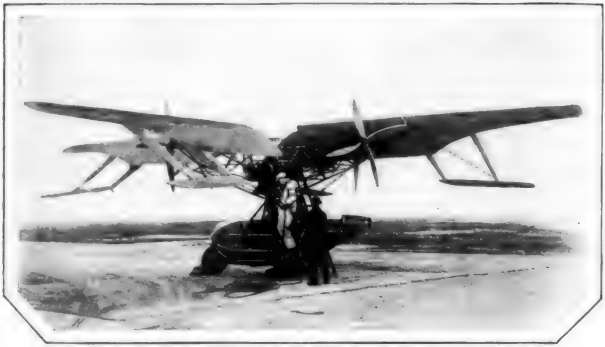
Skeptical engineers point out, however, that "unknown rays" are continually being "discovered" by quite sincere and honest experimenters who mistake some well known fact of nature for a new discovery. Some so-called experimenters, however, deliberately deceive the public with fake inventions in order to obtain money.

North Sea Drainage Project to Increase Area of Europe



If the extensive schemes for the drainage of North Sea are carried out according to the plan illustrated above, which was conceived by a group of eminent English scientists, 100,000 square miles will be added to the overcrowded continents of Europe. The reclaimed land will be walled in with enormous dykes, similar to the Netherland dykes, to protect it from the sea, and the various rivers flowing into the North Sea will have their courses diverted to different outlets by means of canals.

HOW I SOLVED THE



The Curtiss-Bleecker helicopter ready for its initial flight. The construction of the four revolving wings, with their outrigger tails is clearly shown in this photograph.

by MAITLAND B. BLEECKER

(As told to Alfred Albelli)

The problem of vertical flight has been solved at last! Long the subject of experiment by eminent scientist and amateur inventor, the mystery of the helicopter has been unravelled by M. B. Bleecker, young engineer.

I WAS first smitten with the helicopter bug six years ago. Today I am thrilled by the view of the finished product, the first genuine, full fledged helicopter in existence. Now I am ready to explain the mystery of the helicopter.

In all frankness I must admit that I became acquainted with the idea and the principles of the helicopter before I really knew the definition of that term. That was while I studied engineering at the Bach School of Aeronautical Engineering at the University of Michigan, six years ago. I was 21 then.

Before I go into detail concerning the six years of intensive research, designing, experimenting and construction involved in my helicopter plane, completed last June at the Curtiss-Wright factories at Valley Stream, Long Island, I want to explain that a helicopter is a flying machine able to lift itself vertically off the ground. That's the first point. Second, the true helicopter must be able to hover indefinitely over a given spot. It must be able to descend vertically under its own power, and to achieve a safe descent in the event of engine failure. All of this is in addition to being able to move horizontally at satisfactory speed and to be controllable and satisfactorily stable under all flight conditions.

There has been any number of helicopter designs that have successfully lifted themselves off the ground vertically and in some cases attained considerable altitude, but so far as I have been able to ascertain, there was not any one which satisfactorily combined all of the other performance elements of the true helicopter to a degree that makes it a practical machine.

For the private owner of aircraft, or for commercial or military operation, the advantages of being able to operate from any

HELICOPTER Problem

The "Wasp" air-cooled engine is clearly seen in the framework above the fuselage.

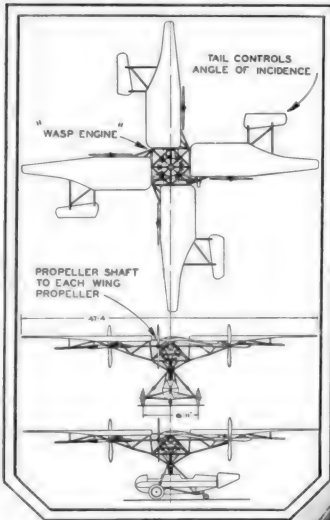
small plot of ground and to return successfully to the ground are obvious, and it is not beyond the realm of possibility, I feel, that such an airplane, when placed in practical operation, might revolutionize commercial aviation as it exists today.

My so-called Curtiss-Bleecker helicopter consists essentially of four large wings, or blades, mounted at right angles to one another and revolving in a horizontal plane. The wings are caused to revolve by propellers, one to each wing, mounted forward of the leading edge, about two-thirds of the way out.

The propellers are driven through a gear and shaft arrangement from one central engine, a 425-horse power air-cooled radial, mounted horizontally. To each of the wings are attached outrigger booms mounting small elevators or tail surfaces.

Thus, each unit is in reality a small airplane, consisting of a power-driven wing with a tail which can control the angle of incidence of the wing at any point. Beneath the four wings is slung a small fuselage. In this is located the crew. It is equipped with a conventional type of landing-gear.

Despite its radical departure in design



These drawings reveal construction of the Curtiss-Bleecker helicopter. Note propellers on each wing all geared to the central motor.

and construction from any other type of flying machine, my helicopter does resemble somewhat, in outward appearance, the De La Cierva autogyro. There is one strong fundamental difference in design, however. The wings of my helicopter are made to revolve by the pull of their propellers. In the autogyro, the rotation of the wings results from the forward motion of the entire machine.

This variance in design means that the helicopter can soar vertically off the ground without any run and can hover indefinitely over any spot, performances which cannot be attained by the autogyro.

It was while I was an engineer at the National Advisory Committee for Aeronautics at Langley Field in the early part of 1926 that I completed my plans for the helicopter. Instantaneously I was ordered to take up quarters at the Curtiss workshops. Four years of downright hard work followed. A whole year and a half was taken up with research and wind tunnel testing to determine the flight possibilities of my model.

My toughest job came in the making of an intelligent engineering analysis of my problems. Take for instance, the hovering condition of flight, where the machine must remain stationary in the air at a given point. The regular wind tunnel equipment was inadequate and it was necessary to devise special methods. We built special apparatus for this and for other tests. Everything was veiled in secrecy for four years. Not one iota of detail leaked out.

My job is done. I feel that I have given to aviation an engine of the air which will revolutionize the industry if properly nurtured. My helicopter will rise vertically, it will hover over a given spot, it will descend safely vertically, and move horizontally at a reasonable speed. It should be an invigorating spur to aeronautics.

Maitland B. Bleecker, Curtiss experimental engineer, who designed the ship which bears his name, sitting at the controls. Conventional airplane construction practice is adhered to throughout the design.

Parachute Jumper Gives Imitation of a Flying Squirrel

Above: Rex G. Finney and his pilot, just before taking off to perform his spectacular stunt. The pictorial diagram at the left shows how the thrilling glides and stalls are executed.

IN a startling imitation of a flying squirrel, Rex G. Finney, parachute jumper of the Curtiss-Wright Flying Service, demonstrated his stunt of becoming a human glider before the public recently with great success.

A triangular piece of sail cloth sewn between the legs of his flying suit acts upon the air in the same manner as the membranes of the flying squirrel, enabling him to perform thrilling glides and stalls while in the air.

As he jumps from the plane, Finney stretches his legs apart, and the wind, acting upon the web between his outstretched legs in much the same manner as it acts upon the elevators of a plane, enables him to glide a steep angle. By doubling his knees he is thrown into a climbing stall.

Interpreters Use Special Phone to Translate Speeches

AT THE world power conferences, where representatives from the various nations assemble to thrash out international complications, the words of a speaker talking one language must be made comprehensible to an array of listeners whose native tongue may be anything from Swahili to Cockney. In order to make all representatives understandable to each other, a device has been invented which makes it possible for the delegates of any nation to follow the speeches in any language. This device, shown at the right, is a microphone into which an interpreter speaks, translating sentence for sentence the words of the speaker. At the meetings, a battery of interpreters translate the speeches into all languages.

A battery of interpreters, each equipped with one of the phones shown above, translate the words of the speaker into the various tongues.

Canada Tar and Gas Yield Fuel

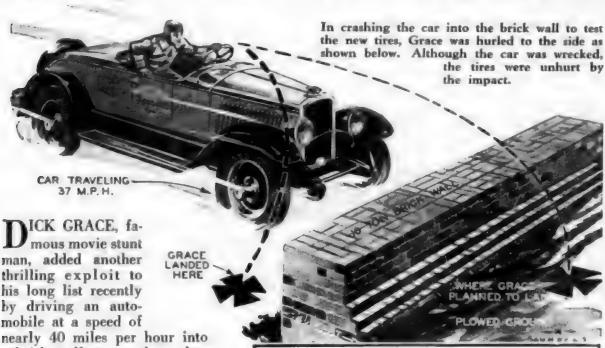
COMBINATION of two natural products of western Canada, which are almost useless, tar and natural gas, to make large quantities of gasoline is forecast by an eminent Canadian geologist. Beneath Alberta fields there exists large deposits of sand containing tar, which, by a process of hydrogenation, using the plentiful natural gas of the country, can be converted into fluid oil and thence into gasoline.

Proposed $60,000,000 Bridge Over Narrows to be Longest in World

A BRIDGE, which is to be the longest in the world, with a central span that will be 1000 feet longer than the Hudson river bridge, and towers that will be higher than the Woolworth building, is soon to be built over the Narrows between Staten Island and Long Island. The complete structure, shown in the architect's drawing below, will have observation galleries, beacon lights, and a carillon of bells.

Architect's drawing of proposed Narrows bridge, showing the 4,500 foot span and 800 foot towers.

Auto Crashed into Wall in Tire Test



In crashing the car into the brick wall to test the new tires, Grace was hurled to the side as shown below. Although the car was wrecked, the tires were unhurt by the impact.

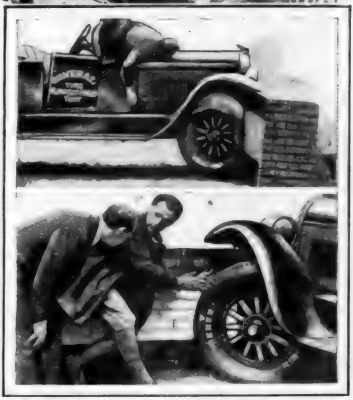
DICK GRACE, famous movie stunt man, added another thrilling exploit to his long list recently by driving an automobile at a speed of nearly 40 miles per hour into a brick wall to test the endurance of a new type of tire.

When the 3,500 pound car was stopped abruptly by the 10 ton brick wall, however, Grace did not sail gracefully over the wall into the soft mixture of cork and sand placed there to absorb the shock of the fall as he expected, but was first thrown against the dashboard, his body bending double, and then hurled out onto the ground at the side. Grace had his usual luck and suffered only a slight injury to his knee.

The tires tested had built-in rubber shock absorbers and were said to be safer than the more common type. Tire men regarded the test as having considerable significance, for the failure of a front tire traveling at high speed almost invariably results in a bad crash.

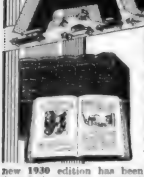
The crash wrecked the front end of the car completely, and moved the engine back about four inches. The tires, however, were unhurt, even though they struck the wall with such force that they were flattened completely, and the rims bent behind them. Speed photographs of the test showed that the tires rebounded so that they were completely clear of the wall an instant after the impact.

The wall was built specially for the test. The section weighed about ten tons and was imbedded three feet in the ground to give solidity. When the crash occurred the wall remained firm, thus placing all the recoil of the impact upon the car. The ground behind was ploughed to soften the fall.



In the crash Grace was thrown against the dashboard. The axles were bent and the tires flattened but not damaged.

NOW FIX ANY MAKE OF AUTO



SIX BIG AUTO BOOKS ALL SHIPPED FREE

on approval; whether you want to qualify as garage owner, auto repair expert or merely wish to know how to keep your own car 100% efficient, look at these books —they are sent to you for free examination. This brand new 1930 edition has been prepared by a large group of America's greatest automotive engineers. Anybody who can read will understand them, for this great automobile encyclopedia is a veritable gold mine of valuable facts. Take advantage of this great opportunity now; send in the coupon for FREE examination. You don't pay us a penny, you don't obligate yourself to pay anything unless you decide to keep the books. Just tell us you want to see them and the full set of 6 great volumes, just off the press, will be sent to you. Read them, look them over and prove to your own satisfaction that one fact alone, which you will find in them, may save you an expensive repair, or help you to a better job.

Aviation Motors

In addition to being a complete engineering and automobile encyclopedia, these books contain the first parts of Aviation Motors and as time goes on all the new Low Price Models as well as the latest information obtainable will be published in these books making them invaluable to anyone.

New 1930 Edition

Imagine books which are so new that every page is right up to date—wiring diagrams, construction details, service problems—are all right up to the minute. Nowhere else that we know of can you get as complete and up to date information. Over a million dollars of resources have enabled us to give you the most up to date books on the subject ever published. You will find nearly **2000 pages** on front wheel drives alone. Everybody interested in automobiles in any way will welcome these books, especially on our **no money offer.**

CAN YOU FIX IT?

Can you take out "play" in differential? Can you kill the "shimmy" in steering? Can you repair IGNITING? Can you put your finger on engine trouble without guessing or tinkering? Can you pull the starter off and fix it? Can you adjust and repair transmission, engine, rear axle, bearing?

These Books Tell How

and they tell you how to do any and every auto job right, the first time.

6 Big Volumes

Nearly 3,000 pages, over 2,000 illustrations, wiring diagrams, equipment charts, etc. De Luxe edition with gold-stamped flexible binding. Sent FREE for 10 days' use. If not wanted return express collect. If kept, send only $2 after 10 days, then $3 a month until special advertising price, $24.80, is paid.

A Year's Consulting Membership FREE!

Privilege of consulting engineers of million-dollar American Technical Society on any automotive problem for one year without charge, if you mail coupon immediately.

SEND NO MONEY

American Technical Society, Dept. A-6320, Drexel Ave. at 58th St., Chicago, Illinois.

I would like to see the new 6 volume 1930 edition of your automobile books but without any obligation to buy. I will pay the few cents delivery charges only and will examine the books and return them at your expense in 10 days' time if I like them, which time I will send you $2.00 (instead of $3.00 per month until the special price of only $24.80 is paid. You are to include free, consulting membership certificate in the American Technical Society. Send brand new 1930 edition.

Name .....

Street .....

City ..... State .....

Employer's Name .....

Employer's Address .....

Billy the Kid!

Read the thrilling story of the most famous and glamorous outlaw of the old west as he is being brought to life on the screen by Johnny Mack Brown. One of the many interesting features in

The September issue of

Screen Play secrets

On Sale August 5th

Delightful, new facts about beautiful Joan Crawford; other personality stories on Janet Gaynor, Sue Carol, Richard Barthelmess and other popular stars. **So This Is Hollywood**, Screen Reviews, Last Minute News and countless other absorbing departments and features.

WRITE TO YOUR FAVORITE STAR

Each month you may write to your favorite player through SCREEN PLAY Secrets and receive a personal reply. See this issue for details of this service which is free.

If your news dealer is sold out, send 25c to SCREEN PLAY Secrets Magazine, Fawcett Publications, Inc., Minneapolis, Minnesota, and your copy will be mailed you at once.

RACE with the BREEZE!

COME ON!

SWING into the saddle of a Harley-Davidson and ride away over the "Thrill Trail". Feel the surging power of that quiet motor as you twist the throttle. Flashing speed—rocket acceleration — and so easy to handle!

Feel the cool wind in your face — no cooped-up motoring for you! Swing past the crawling cars — out into the country where lakes, and streams, and Thrills are waiting for you.

You can *afford* long tours and vacation trips by motorcycle, for total running costs are only a penny or two per mile. And a Harley-Davidson is easy to buy. Ask your nearest dealer about his convenient Pay-As-You-Ride Plan.

Ride a **HARLEY-DAVIDSON**

MAIL THE COUPON FOR ILLUSTRATED LITERATURE

HARLEY-DAVIDSON MOTOR CO.
Dept. MM, Milwaukee, Wis.
Interested in your motorcycles.
Send literature.

Name.....
Address.....
.....

My age is ☐ 16-19 years, ☐ 20-30 years, ☐ 31 years and up, ☐ under 16 years. Check age group.

free

readings of your character!

will you succeed in life?
do you fit your job ?
are you unhappy?

If you have questions that demand an answer, watch for the first issue of

MYSTIC

MAGAZINE

on sale September 1

Authorities on PALMISTRY

will answer your queries FREE!

▼

ASK YOUR DEALER

Short Wave Radio Set

(Continued from page 167)

not come in with a plop. If they do, reduce the "B" battery voltage with the variable resistor or try different grid leak values to the detector tube.

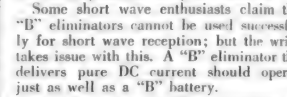
Usually the higher the resistance the easier regeneration will start. Some tubes may require up to nine megohms of grid leak resistance. Simply try and try till the best grid leak values are found.

Too many turns on the tickler coil may also cause a plop when regeneration commences, or they may cause a persistent howl. In that case take off one turn at a time until the minimum number is procured that will regenerate over the entire band. This is a case of cut and try till you get the best results.

If there is no regeneration at all, try reversing the connections to the tickler coil on the terminals of the plug-in coil socket. Some experimentation here is necessary before the highest efficiency is achieved.

Some short wave enthusiasts claim that "B" eliminators cannot be used successfully for short wave reception; but the writer takes issue with this. A "B" eliminator that delivers pure DC current should operate just as well as a "B" battery.

Be An Aviation Expert!



Daring young men are needed now—excitement, thrills and big money await you in this new, unexploited profession. Get in on the ground floor—men like Henry Ford are investing millions! Now is the time to act.

Easy to Learn—In Spare Time

An amazing new, easy method fits you to qualify quickly at home in spare time. Send at once for startling FREE Book, *Opportunities in the Airplane Industry* — tells about the future that awaits you in this exciting, thrilling field. No obligation.

AMERICAN SCHOOL OF AVIATION
3601 Michigan Ave. Dept. 2088 Chicago, Ill.

1. What was the name of the plane in which Byrd flew over the South Pole, and what do you know of the person for whom it was named? (See page 84)

Food Expert Suddenly "Strikes Fortune"

With New Food Discovery

Many poor men and women have become rich by pure "luck" and in other peculiar ways. Many have become "rich" by getting in early on some new discovery or invention that was destined to take the country by storm. But few have had an opportunity like this newest announcement—to step into a big money business where everything was planned for them so all they had to do was to reap the reward. Now one of America's nationally-popular food specialty corporations announces a plan for making men and women big money that is said to be creating a flurry. For it is worked out to do three almost unbelievable things. First—to actually *double* the income of the firm's local operators. Second—to secure 100% distribution of a very profitable product. Third—to do these two unusual things without requiring their operators to do difficult selling. You simply start your big money coming in by actually *giving away* samples of this delicious food specialty. Already hundreds of men and women report astonishing earnings.

The market for this kind of delicious food specialty, that has captivated the palates of America, is so tremendous that in order to be sure that grocers are kept in fresh supplies daily, this big firm now must have local men everywhere. We don't need high pressure salesmen or smart talkers. For by this new plan you don't need to do any difficult selling. Among the principal things we want you to do is to manage free sample distributors, put advertising in grocers' windows, see that grocers are supplied, carry out our "no-selling" distribution plan and run the business in your town. In almost no time you should have a string of grocers, druggists, roadside stands, restaurants and delicatessen stores all giving you a steady income. You start right into big money at once. You might say you immediately start a $10,000 a year business all your own. When you see the money records made by other local operators you will realize why this is possible. On our generous plan you take all the profits of your business. You get complete control of the business and can call it your own. You cannot be "fired" by anyone on our plan. Once you join us you can be "set" for life with us. Already tremendous quantities of this kind of delicious food is consumed every year. And our national advertising is popularizing it more and more all over the country. People like this food specialty because it is tempting, tasty and easily digested. Children crave it. Grown-ups eat it by the dozen. Nearly every grocer, bakery and delicatessen in the country is eager to sell it. We are now ready to give this vast business to local people who will take care of it. Now for once, poor men and women have their chance. It used to be necessary for a person to have a lot of capital to get into business. No need to worry about this now.

Minch Made $3,000 In 3 Months

This record of Tom Minch, one of our local operators, is but a sample of the almost unheard of money this opening offers. Look at the money these others have made: "My business was a success from the first day. I made over $3,000 my first three months." Mrs. Roy Brown of Michigan writes, "It is easy to clear $10 a day." Costopolis of Illinois writes, "It is not unusual for me to take in $15 in a couple of hours."

As soon as this generous plan becomes known we will probably be swamped with applications. For this reason we advise you to send your application at once if you want a big-profit business of your own. Don't worry about business experience or big capital. What we want are honest, ambitious people. Don't send any money. Just rush application below to Henry Adams, President, Dept. 469, 500 No. Dearborn St., Chicago, Ill.

Henry Adams, President,
Dept. 469, 500 No. Dearborn St., Chicago, Ill.

Please accept my application as an operator in my town to manage free sample distributors, look after dealers, etc. Tell me how to start right into a big profit business without worrying about big capital.

Name .....

Address .....

City..... State.....

Just Out!

the very latest and never before disclosed Secrets of

Magic

Astonish Your Friends

Be a Magician!

Write for Details

NOW!—*if you act quick!*—you can learn magic, real professional magic, right direct from the world famous magic wizard, Dr. Harlan Tarbell. All made simple and easy by his great new method. Send today for details, low prices, easy terms and big free literature.

Tarbell System, Inc., Studio 23-56
1926 Sunnyside Avenue, Chicago, Ill.

Tarbell System, Inc., Studio 23-56
1926 Sunnyside Avenue, Chicago, Ill.

Gentlemen: Without any obligation send me your free literature and information all about your wonderful "Tarbell Course in Magic." Also tell me about your Low Price Offer and Easy Payment Plan.

Name.....

Address.....

.....Age.....

How I Broke Record—Soucek

(Continued from page 49)

the pressure in my lungs, so that the incoming oxygen, instead of being forced out of my mouth again, will enter my lungs properly.

However, this tube has to be opened quite often, so as to let the poison air out. Some weeks ago, while making a test altitude flight of around 35,000 feet, I forgot to release my grip on the tube with the result that almost immediately it became very difficult for me to breathe. In fact, the pressure on this tube became so pronounced that it actually blew the breath out of the corners of my mouth so that I could see it freeze!

Of course, I released the tube, but it did not open. The inner sides had frozen together where it pressed flat. However, I somehow managed to jiggle it around and break it loose until it worked.

Now, for the actual flight! The time was exactly 2:18 when everything was in readiness and I finally did take off, sweating under the tremendous burden of my heavy equipment. On this particular June afternoon the wind out of the west was not so very different from the speed of the plane, so that I simply pulled back the control stick and then went straight up in the air until I reached the "ceiling," or maximum height of the plane.

Just a few words, however, about my immediate problems while so doing. All I had to do was to continually hold the throttle and supercharger levers open with one hand, and work the stick, oxygen valve, oxygen "lung" outlet and a couple of other gadgets with the other.

Meantime, of course, I had to use my feet on the rudder, too, and keep a watchful eye on the flight instruments. Easily the worst thing of all is to hold all the levers open at the proper times. However, they are equipped with a strong spring so that should I pass out from lack of oxygen, then the throttle would automatically close and the supercharger be cut off.

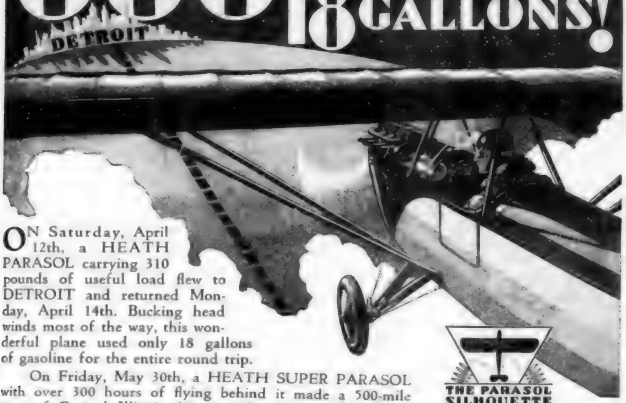
In such case the plane probably would go into a dive, but I would likely revive soon, and no harm would be done. However, if the motor happened to be left running wide open during the dive, then it would soon tear everything to pieces.

Holding these levers open is something

(Continued on page 182)

600 MILES ON 18 GALLONS!

DETROIT



ON Saturday, April 12th, a HEATH PARASOL carrying 310 pounds of useful load flew to DETROIT and returned Monday, April 14th. Bucking head winds most of the way, this wonderful plane used only 18 gallons of gasoline for the entire round trip.

THE PARASOL SILHOUETTE

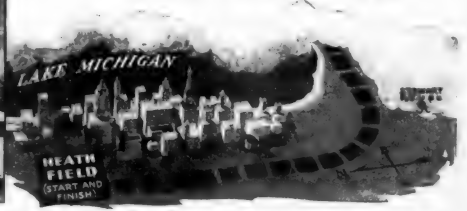
On Friday, May 30th, a HEATH SUPER PARASOL with over 300 hours of flying behind it made a 500-mile tour of Central Illinois Airports. It was accompanied by one of the new PARASOLS. A perfect schedule was maintained, even with this old plane with nearly two years of flying behind it.

These HEATH PARASOLS got out of all kinds of fields and at no time would a forced landing have meant anything more than a few minutes' delay as any highway or back yard is an Airport to a HEATH PARASOL.

On June 7th, a HEATH PARASOL won the spot landing prize at ROCKFORD, Illinois Air Meet, exemplifying the ability of this plane to land accurately, and exactly where the pilot desires. You can build this little plane at home at a cost of only $199 and get started with an investment of only $12.00, or purchase it ready to fly at $975.00.

Send 10c for large illustrated booklet describing this wonderful little plane.

18 GALLONS DID IT!



HEATH AIRCRAFT CORPORATION

Dept. M-9

1721-29 Sedgwick St., Chicago, Ill.

Play the Hawaiian Guitar like the Hawaiians!

Only 4 Motions used in playing this fascinating instrument. Our native Hawaiian instructors teach you to master them quickly. Pictures show how. Everything explained clearly.

Play in Half Hour
After you get the four easy motions you play harmonious chords with very little practice. No previous musical knowledge needed.

Easy Lessons
Even if you don't know one note from another, the 52 printed lessons and clear pictures make it easy to learn quickly. Method

GIVEN when you enroll
—a sweet toned HAWAIIAN GUITAR, Carrying Case and Playing Outfit—Value $30 to $40
No extra—everything included

WRITE AT ONCE for attractive offer and easy terms. You have everything to gain. A postcard will do. ACT!

TENOR BANJO and other courses. The same thorough instruction on Tenor Banjo, Violin, Tiple, Tenor Guitar, Ukulele, Banjo Ukulele. Well known instructors. Write for full information.

FIRST HAWAIIAN CONSERVATORY of MUSIC, Inc.
Dept. 664, 1922 Broadway, New York, N. Y.
Approved as a Correspondence School Under the Laws of the State of New York
Member National Home Study Council

Don't Let $1.00 Stand Between You And A Good Head Of Hair

For years I suffered from dandruff and falling hair, until a friend told me an old Canadian method. This treatment will stop falling hair, eradicate dandruff and grow new hair. My baldness has been replaced with luxuriant new hair. Dozens of my friends have had equal results. The method is simple, easy and positive. Send me $1.00 to cover costs and I will mail you this prescription and method of treatment with my positive guarantee that you will be satisfied or I will return your money. A few cents at any druggists buys the necessary ingredients. You will thank me many times, as my friends have, for telling this method which has succeeded where everything else has failed. $1.00 only, and your hair trouble is solved for the rest of your life.
STED PITT, Dept. I-0, 153 Court Street, New Haven, Conn.

Men Wanted, BIG PAY

Imagine yourself—getting paid for having fun, being popular. Big pay too. You'll be *"the luckiest guy in the world!"* when you learn to play a Saxophone, Trumpet *or any other*

BUESCHER True-Tone INSTRUMENT

Any man, woman, boy or girl can soon master a Buescher Saxophone. *A few lessons* give you quick, easy start. *Play scales first hour,* tunes *in a week;* join a band in 90 days.

EASY TO PAY TAKE six days' *free trial* on any Buescher instrument. *See what you can do.* EASY TERMS. Play as you pay. Send the coupon today for *beautiful catalog.* Do it *right NOW!*

BUESCHER BAND INSTRUMENT CO.
915 Buescher Block, Elkhart, Indiana B34
Without obligating me in any way, please send catalog of [ ] Saxophones [ ] Trumpets [ ] Trombones
Me ition any other _____ My age is _____
Name _____
Street Address _____
Town _____ State _____

How I Broke Record—Soucek

(Continued from page 180)

like holding down for a long time on the clutch of an auto. For over an hour I had to push with my left arm without letting up, and my arm got mighty tired.

After nearly an hour of climbing straight up from the Anacostia Naval Air Station I reached, according to my altimeter, an indicated height of 41,500 feet, a point where the ship no longer seemed to be climbing a trifle. Instead it appeared to be hanging motionless on its roaring propeller while powerful superchargers shrieked as they sucked and pumped the thin air into a density sufficient to keep the straining engine working.

For about 20 minutes thereafter I kept the plane's nose pointed straight up, and the engine wide open in an effort to gain a few more precious feet. During this time the needle fluctuated and at times swung past the 42,000 mark, but I couldn't get it to stay there.

Maybe I could have achieved more altitude, but I realized, glancing at my gasoline gauge, that the effort would be futile, for I actually had barely two gallons of gas left in my tank when I finally did land around 4:30 o'clock.

Fortunately I did not suffer greatly from the effects of the extreme altitude and bitter cold (about 76 degrees F). However, at one time the oxygen tube through which I breathed filled with ice and I was forced to beat the tube against the fuselage and to shake the accumulation out in order to continue breathing.

Photos ENLARGED 98c

Size 16x20 inches
Same price for full length or bust form groups, landscapes, pets or any music, etc., enlargements of any part of group picture. Return of original photo guaranteed.
SEND NO MONEY Just mail photo or snapshot (any size) and within a week you will receive your beautiful life-like enlargement size 16x20 in., guaranteed fadeless. Pay postman 98c plus postage or send $1.00 with order and we pay postage. **SPECIAL** With each enlargement we will **FREE OFFER** send Pair Assembled Initial Rings. Take advantage now! Only one enlargement to a customer. Use reproduction of photo below and your photo today.
UNITED PORTRAIT COMPANY
900 West Lake St., Dept. L-370, Chicago, Ill.

2. Who holds the Navy parachute jump record? (See page 84)

Crashing Movie Models

(Continued from page 45)

'em." However, there are times when only a pilot with a fixed suicidal complex would undertake to bring about some crashes. Then Harry Reynolds' ingenuity is called forth. He "shoots" a pilotless plane into the air. This is done by running a "prop" plane along a runway. The take-off end of the runway is tilted up and the plane zooms into the air. If the plane is to come down in flames, a flare is set off by a trigger at the end of the runway.

To shoot a pilotless plane into the air, and to have it "crack up" at a predetermined point, requires very fine mathematical precision. But factors beyond the control of the technician—an unexpected side wind, for example—may upset the best laid plans. That happened in the illustration shown. This plane was supposed to "crack up" a little to the left of where it inevitably will crash. You will note that it is bearing down on some trucks—an ammunition train. The scenario called for the troops to continue the advance, but when they saw that roarin', winged rocket coming at them, they decided, to a man, that absence of body was preferable to presence of mind. and they beat the hastiest retreat on record. It really enhanced the story. The scenario was revised to fit the scene.

The terrific explosions following a bombing, how are they brought about? Visually, they are powerful enough to shake a whole city and to break every window within a mile radius. Visually, I said. "Expert explosion engineer" is one of Harry Reynolds' monickers. For picture presentation, an explosion must *look* big. So a shallow, concrete basin is poured in a hole in the ground at a designated spot. Several sticks of dynamite are put in this and covered with a few hundred pounds of common lamp-black. An illustration shows the result.

In this particular case, an airplane supposedly has dropped a bomb to blow up a temporary military bridge across the river flats. In reality the explosion is the result of the ground charge. The aeroplane is just beyond the dense, black wall of "smoke." A few minutes later, when the lampblack began to settle, every "extra" from Pittsburgh got homesick.

No one can predict to what heights movie modeling will attain. With "The Lost

(Continued on page 186)

NERVES?

Are You Always Excited? Fatigued? Worried? Gloomy? Pessimistic? Constipation, indigestion, cold hands, dizzy spells and sex weakness are caused by nerves, not weakness. Proper, common sense, medicines correct nerve weakness, increase vitality, restore vigor, calmness and Self Confidence. Send 25c for this amazing book.

NERVE EXHAUSTION. RICHARD BLACKSTONE, M-339, Flatiron Bldg., N. Y. C.

GOV'T. POSITIONS

$35 TO $75 WEEKLY

MEN WOMEN AGE 18 TO 55

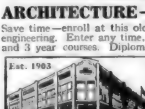
( ) Railway Mail Clerk ( ) Meat Inspector
( ) P. O. Clerk ( ) Special Agent
( ) P. O. Laborer ( ) Customs Insp.
( ) File Clerk ( ) Steno-Typist
( ) Matron ( ) Immigrant Insp.
( ) General Clerk ( ) City Mail Carrier
( ) Chauffeur-Carrier ( ) Border Patrol
( ) Skilled Laborer ( ) Typist
( ) Watchman ( ) Seamstress
( ) Fireman ( ) Stenographer
( ) RFD Carrier ( ) Auditor

Instruction Bureau, 233, St. Louis, Mo.
Send me particulars about positions marked (X)... salaries, locations, opportunities, "How to Qualify" etc.
Name
Address

ENGINEERING—ELECTRICITY ARCHITECTURE—DRAFTING

Save time—enroll at this old established school of engineering. Enter any time, days or evenings, 1, 2 and 3 year courses. Diplomas and B. S. Degrees. Special 4 months' practical course in Drafting. Other short courses. Low tuition —easy terms. Earn while you learn. Free employment bureau. Athletics. Successful graduates everywhere. Write for our free, illustrated 80 page "Blue Book." It gives you all the facts. Address the President. Charles W. Morey, B. S., M. E.

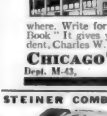
Est. 1903



CHICAGO TECHNICAL COLLEGE
Dept. M-43, 118 East 26th Street, Chicago, Ill.

STEINER COMBINATION WOODWORKER $45.00

Belt Sander, Saw, Grinder, Drill



Has ¾ H. P. GE Motor, switch, cord and plug. 3x24 in. sander, 6 in. adjustable saw, 5x8½ in grinder for any tool or drill.

Takes up to ¼ in. drills. Operates many other tools. Bronze bearings, endless belt, polished table. Size 20x20. Weight 60 lbs. Highest grade—lowest price. Satisfaction guaranteed. Order now or write for circular M M

Pats. Pends

STEINER-FULTON PROD. CORP.
5781 Easton Ave. St. Louis, Mo.

No Wind Can Blow It Out

SELF STARTING LIGHTER

SOMETHING DIFFERENT

No Flint. No Friction.

MAKE UP TO $40 A DAY

Showing My Mystery Lighter to Men. What Makes It Light? All Guaranteed. No Flint or Friction. New Principle of Ignition. Sample with Sales Plan, 25c. Sample Gold or Silver Plated, $1.00. Agents write for proposition. New Method Mfg. Co., Box M-9, Bradford, Pa.

Learn to PAINT SIGNS and SHOW CARDS

We quickly teach you by mail, or at school, for spare time. Big demand. Big future. Interesting work. Only necessary training. EARN $50 TO $100 WEEKLY

Otto Lampert, Jr., writes: "Upon graduation, made $17.00 in my big business in one year. John Vrasos, N. Y., gets $25 for a show card. Crawford, B. C., writes: "Earned $200 while taking course." Write for complete information.

DETROIT SCHOOL OF LETTERING
191 Gilmson Ave. Est. 1899 DETROIT, MICH.

See the Craters in the MOON!

Astronomical and Terrestrial TELESCOPE
Magnifies 30 Times

Own a genuine Astronomer's Telescope. Sun thousands of miles away. Make sun, moon, planets stars your neighbor neighbors. Moon Craters, Sun Spots, Eclipses, Comets enlarged 30 times. Strange thrills!

See Landscapes, Games, Ocean Scenes Enlarged 30 Times!

Diameter 2 inches. Special friction adjustment for focusing. Adjustable bracket and clamp can be fastened to chair, fence, branch, etc. Finest materials. Will last lifetime.

Hours of fun looking at scenery, games, bathing beauties. Great for trips and voyages. Made like telescopes used in observatories. Gerding wrote, "Moon seemed 10 yards away."

Price Only $3.95

Five Days Free Trial

Rush only $1.00 now. Pay balance ($2.95 plus postage) when postman delivers. Keep 5 days. If not delighted, return telescope and money will be refunded.

EARN $10 A DAY
Charge 25c to look at the moon

ROLLO SPECIALTY CO
Dept. K-45
229 E. 3rd St., Cincinnati, O.

TEAR GAS FOUNTAIN PEN GUN!

100% Protection—No Injury

Amazing Invention. Has Size, Shape and Appearance of a Fountain Pen—BUT—it shoots TEAR GAS. A safe, effective substitute for dangerous firearms. Just point it—release safety trigger and expect a cloud of Blinding TEAR GAS. Instantly Stops, Stuns and Incapacitates the most vicious Man or Beast. No permanent injury. Dependable, Money Back Tear Gas more than bullets. Only 5½ inches long. Fits in pocket. Carry it anywhere to protect life and property. Ideal "Self-Defense" protector for Motorists and Women. Shoots far enough to be safe to effect your get away. Tear Gas Shells as Official Police Equipment. Practice built. Not a Toy.

AGENTS: Sells in a flash. Hot SELLING novelty of the year. Quick Sales—Big Profits. Everyone who sees it wants one. Earn up to $20.00 daily. Makes an amazing demonstration that rolls in the money. Write Today for details or send only $2.95 for Sample Pen-Gun, Tear Gas Ammunition and Demonstration Outfit. Mental replies fit for. Not Sent C. O. D.

LACHNITE CO., P.O. Box 1719-C-32, CHICAGO, ILL., U.S.A.

High School Course in 2 Years

This simplified, complete High School Course—specially prepared for home study by leading professors—meets all requirements for entrance to college, business, and leading professions.

20 Other Courses

Over 200 noted Engineers, Business Men, and Educators helped prepare the special instruction which you need for success. No matter what your inclinations may be, you can't hope to succeed without specialized training. Let us give you the practical training you need.

American School
Drexel Ave. & 58th Street
Dept. H-933, Chicago

Money Back When You Finish If Not Satisfied

AMERICAN SCHOOL, Dept. H-933
Drexel Avenue and 58th St., Chicago

Send me full information on the subject checked and how you will help me win success in that line.

....Architect	....Electrical Engineer
....Building Contractor	....General Education
....Automobile Engineer	....Lawyer
....Civil Engineer	....Mach. Shop Practice
....Structural Engineer	....Mechanical Engineer
....Business Manager	....Steam Engineer
....C. P. A. & Auditor	....Draftsman & Designer
....Bookkeeper	....High School Graduate

Name.....Age.....

St. and No.....

Town.....State.....

This MM Glider Flies Well

(Continued from page 36)

Harold White, writing for the Kansas U Glider Club, sends us this shot of the Northrop Glider his club built. Also the letter printed below.

DOWN at Lawrence, Kansas, lives Harold White, radio amateur (call 9f.u.g.) and aviation fan. He was kind enough to think of this yere old slang slinging hangar hophead in sending in the notes on the success of the project in which friends in the Kansas U Glider club built a Northrop Glider from plans in the 1930 FLYING MANUAL. He says in part:

> Referring to your Modern Mechanics of last May will say that we tried your plans for the Northrop Glider, and met with some success. Due to the fact that we managed the flying rather poorly we had a good many crashes and some work in keeping it in repairs, but we rebuilt all the broken parts until we finally had rather a good training glider.
>
> This fall past we joined the K. U. Glider Club. We have 2 gliders and our group is starting on a 45-ft. sailplane. We have a number of new members in our group, and we found necessary a fool proof method of training new men.

This kind of information from a typical M-M reader is highly interesting. A man named Heath, down in New York, has built both the Duede and the Northrop glider, too. He wrote a letter to me the other day that'd split the sides off a copper washtub. For real good belly-laughs I haven't seen anything to equal it, and I am running the shots and his letter next issue.

One of the photos shows Heath (no relation to Chicago Lightplane Heath) climbing overside as his glider slideslips earthward.

(Continued on page 186)

Thank You for Mentioning Modern Mechanics and Inventions for September When Writing to Advertisers

BUILD AN ELECTRIC AUTO

WITH an old battery or two and a starting motor reclaimed from an old automobile junk pile, you can make yourself a handsome electric auto like the one shown here which will perform surprisingly well. It's easy to build one, following the complete plans and working drawings printed in

How-to-Build-It

The Home Craftsman's Manual for 1930

The electric auto is only one of a hundred worthwhile projects published in this great book for folks who like to build things in their own workshops. Every article is written by America's best technical writers and elaborately illustrated with detailed drawings and photographs. A partial list of contents includes such items as a 15-foot sailboat; a water glider; a canvas canoe; marionette show; model airplanes; radio sets; home furniture; magic lantern; electric motors; bathing beach submarine; steam engines; ozone generator; scooters, sleds, toys, iceboats, and scores of other features.

If your newsdealer is sold out, send 50 cents to Fawcett Publications, Inc., Minneapolis, Minn., and a copy of How to Build It will be sent you at once.

Look for This Cover

NOW ON SALE

Price 50 Cents on all Newsstands

I'll Teach You To Dance

—at home without music or a partner or the Trial is Free

YES—I'll teach you in a few hours—at home—in private—how to learn all the modern dances—Charleston, Black Bottom, Valencia, Canter, French Tango, St. Louis Hop, Latest Waltzes, Fox Trots, etc., or the trial costs you nothing. I'll train you to be an easy, confident dancer by a system so clear, so simple, so complete that you will soon start dancing gracefully—even though you've never danced before.

Dancing Made Simple as A-B-C

You will be surprised to see how easily you can learn to dance by our simple chart system. Every dance is explained step by step with charts and diagrams. You can't possibly go wrong. The directions are so easy to follow, and the pictures are so clear, that you'll be dancing before you know it.

It isn't necessary that you understand music or even have a piano, phonograph or radio. Our remarkable system teaches you a very simple system of timing yourself. It tells how to know by the music what kind of a dance is next, how to start on the right beat, how to follow the music, how to be graceful and feel at ease, how to get rhythm, how to lead or follow, how to stand correctly, how to gain confidence, how to become popular. In fact, in a short time this remarkable system should make you one of the best dancers in your set.

If you want to become a perfect dancer—if you want to be popular—learn to dance at home this new, easy way.

Think of the Good Times You Are Missing

Every time you turn down an invitation to a dance, you are missing hours of fun, enjoyment and pleasure. Dancing is the best of the social accomplishments. If you are a good dancer, you will be the most popular person in your set, and get invitations to all the parties. Why not learn to dance and share the splendid times others are enjoying?

Try for 5 Days FREE

Just send your name and address and we'll send the complete course—323 pages, 49 illustrations, by return mail. When the postman hands you the book, pay him only $1.98, plus the delivery charges. Try the course for 5 days. Then if not satisfied, return it and your money will be refunded. Mail your order now!

Franklin Publishing Co., Dept. A-307
800 N. Clark St., Chicago

Please send me your complete course—"*Dancing Made Easy*"—323 pages, 49 illustrations. When the book arrives I'll pay the postman only $1.98 plus delivery charges. If I am not satisfied after 5 days' trial, I may return the book and you are to refund my money.

Name .....

Street and No. .....

Town ..... State .....

If you are likely to be out when postman calls, send $2.00 with coupon and we'll pay delivery charges. Customers outside U. S. must send cash with order.

Andy's Shop Mail Box

(Continued from page 184)

It gives this old Grease Monk a huge sleeve-laugh to see so-called pulp paper "aviation" books copying our FLYING MANUAL stuff. The Baby Bullet, the Heath Parasol and all the rest are being re-printed as best they can by feverish non-flying editors whose air knowledge is limited to familiarity with newspaper accounts of aviation. Ho hum! The next Manual again'll leave 'em sweating and stealing, a year and a half behind. Look around and see for yourselves, gang. Sez me!

Up at Lake Hopatcong, N. J., the funny vaudeville comedian Joe Cook has a summer home which is replete with all kinds of mechanical rhubarb. Take the golf course, for instance. It is a weird nine hole affair with more criss cross shooting than a tennis match. One green is built like a funnel, so if you shoot the pill onto the green in an easy 35 yd. shot you are bound to make a hole in 1! Then the ball rolls down—but you'd better get your copy of Modish Mekaniks and see what happens to the ball and how it makes its own certificate of a Hole in One! And Joe Cook's Cuckoo Musee is exposed too, with its taxi cab lanterns on the baby grand piano, and the whole series of Objects No Larger Than a Man's Fist. This is a laugh-riot story, Gang!

Crashing Movie Models

(Continued from page 183)

World" and "The Ten Commandments" still comparatively fresh on our memories, a prediction by the ghost of Jules Verne would not be classed as impossible. Harry Reynolds has given me a tentative outline of a futuristic production suggested by the title: "A. D. 2030." I wish I could tell you about it, but I can't betray a confidence. But, oh boy! What a picture it will be under his masterful, technical direction.

Money Money Money

If you want to make some REAL MONEY and PLENTY OF IT; 20th CENTURY BUSINESS ENCYCLOPEDIA will tell you EXACTLY HOW. No book like it ever written before. Crammed full of LEADING SCHEMES, FORMULAS, TRADES SECRETS and MONEY MAKING PLANS, that have been sold at from $1.00 to $100.00 each. Yet this WONDER BOOK cost you only $1.00. Just RUSH ONE DOLLAR for your copy to,

G. AUGUSTUS BURKE, Macon, Mo.

WIN $2320.00

Just to make new friends for our business, we will give away $8,000.00 or more worth of free prizes including TEN BRAND NEW AUTOMOBILES and thousands in cash. YOU can win BOTH a Buick 4-Door Sedan and $1,000.00 cash extra for being quick or $2,320.00 all cash.

CAN YOU PUT A LUCKY STAR AROUND THIS FREE BAG OF GOLD?

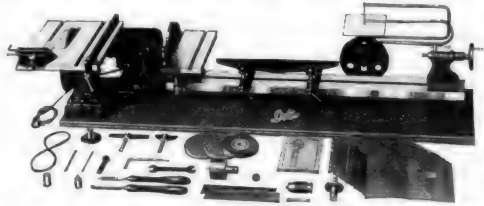
By drawing six straight lines with four dots on each line, a perfect six-pointed star can be made from this puzzle. Can you work it? Hurry! Win this Buick 4-Door Sedan and you can

GET $1,000.00 EXTRA CASH just for being quick

And, positively everyone taking complete advantage of this opportunity will be rewarded. Duplicate prizes will be paid in case of ties. Send your answer now, and if correct, you'll be qualified at once for this great opportunity to win $2,320.00 cash or this Buick 4-Door Sedan and $1,000.00 cash Extra for promptness.

L. Shulman, Dept. 109, 37 W. Van Buren St., Chicago, Ill.

Make Your Own **Summer Furniture**



with "Delta" woodworking Units

Making things out of wood is so easy and quick with this practical, efficient, "Delta" equipment. Saves time, eliminates hard work, and produces better results. Wonderful fun, splendid relaxation as a hobby. A good money-maker too, either full or spare time. "Delta" machinery quickly pays for itself. Complete "Delta" line includes 4" Jointer, Circular Saws, Wood-Turning Lathes, Jig-Saws, Band Saw, Moulding Cutter, and numerous other items of interest to woodworkers—all at astonishingly moderate prices.

BLUEPRINTS

$1 We will be glad to furnish our complete set of 10 Working Blueprints of Summer Furniture upon receipt of $1.00.

10 DAY TRIAL—Easy Terms

For complete details and full description, send coupon. You will learn, also, how you can try any Delta equipment for 10 days under actual working conditions at our risk. Choice of three convenient payment plans. Mail coupon TODAY! Dept. N-830.

Delta Specialty Co.
Milwaukee, Wis.

DELTA SPECIALTY COMPANY, Dept. N-830
Division of "Delta Manufacturing Co."
1601-07 Holton St., Milwaukee, Wis.

Please send me FREE illustrated literature describing 1930 model "Delta" Woodworking Units. Also details of 10-Day Trial Offer and Easy Payment Plans.
☐ I enclose $1.00 for set of 10 Summer Furniture Blue Prints.

Name .....

Address .....

Develop EVERY muscle with this great outfit. All yours for only $5.00. Includes: 10-cable Progressive Exerciser and Chest Expander; Wall Pulley Attachment; Stirrup for leg muscles; two Scissor Grips for developing wrists, hands, arms; patented adjustable Head Gear for building powerful neck; Rowing Machine Attachments; 12 weeks' Home Instruction Course in Scientific Body Building and FREE Encyclopedia of Health and Strength.

Send No Money! Just mail coupon TODAY for this wonderful bargain.

GUARANTEE

You don't risk a cent. Try Outfit 10 days. Money back if you want it. Don't miss this chance! Mail coupon NOW.

Michael McFadden
Dept. W-9, 55 East 11th St.
New York, N. Y.

FREE *Encyclopedia of Health and Strength if you mail coupon at once.*

Michael McFadden, Dept. W-9,
55 East 11th St., New York, N. Y.

Send me ON TRIAL, complete 8-in-1 Outfit as described. I will pay postman only $5.00 plus actual postage on arrival, (or enclose $5.00 and we pay postage). My money back if I return outfit in 10 days.

Name .....

Address .....

Town ..... State .....

Outside U. S. send cash with order

Defying Death in a Parachute

(Continued from page 65)

feet from head to toe, I wasn't any too near the ground at that particular moment. By some miracle, however, none of my body actually was touching the wires, though my 'chute was wrapped around them, and at any moment I might make a contact that would mean my death.

Nevertheless, I somehow contrived to undo my breast strap and both leg straps, but while so doing, my right toe barely touched a section of the wire, with the result that a great wall of flame shot out, badly scorching several shroud lines on the 'chute. But I scrambled quickly to the ground and asked an attendant at the field to have the power shut off. This he did immediately, so that I was able to recover my 'chute without further damage to it.

Talk about a strong wind blowing you all over the heavens! I'll wager I'll always remember the events of August 15, 1928, when I was fortunate enough to set a new Navy altitude record of 15,200 feet.

My pilot, Lieut. Ernest W. Litch of the Naval Air Station near Washington, took me up in a Vought Corsair biplane for what I hoped would be a record jump for all Navy parachute men. When we reached 15,200 feet I signalled Litch that I was ready and then, when he had slowed down to the customary jumping speed of 80 miles an hour, I poised for a brief moment to visualize the scene below. The capital city looked like a tiny park from the great height of 3 miles.

For this particular jump I took the precaution of wearing two parachutes, one of the regulation seat type and the other of the back type for emergency use. However, the first one opened up satisfactorily enough. Yet I soon found myself well nigh helpless before a strong north wind which carried me well over the city. I was like a cork bobbing about in a strong sea, for no sooner did I find myself down to an elevation of 5,000 feet, than a south wind caught me and started swinging the 'chute back towards the Potomac River from whence I had come.

Now, the average parachute jump takes only from 30 seconds to one minute, so one can well imagine how I felt when, after being aloft 15 minutes, I began to realize that I would be lucky to even make a safe landing, let alone a good one. All the while,

of course, as I neared the earth I kept looking about for a possible landing place. Two hundred yards or so from the ground, in one of the most crowded sections of the city, I was forced to conclude that my best bet was to try to land on a nearby apartment house. I was unable to make the roof, however, but skimmed over it, my feet catching in a radio aerial.

Fortunately for me, the 'chute caught on the ledge at the top. But I couldn't quite reach down far enough to catch the fire escape six feet below, so I just hung there. Meanwhile hundreds of people were watching me from the ground, and to add a bit of humor to my hazardous situation, an excited woman threw open a window in an apartment nearby, and while I swung like a pendulum with each new movement of the wind, she entreated me if I wanted a glass of water.

I assured the good lady that I did not, and while so doing three policemen came to my rescue, raised a ladder to the roof, and I managed to clamber down the fire-escape to safety.

How does it feel to make a jump? Well, there's a new kind of thrill most every time, depending largely on how the winds and currents are behaving. But generally the first sensation is of a rushing wind and a terrific descent. Then, after you pull the rip-cord you get something of a jolt as the 'chute opens. After that it's all pretty much plain sailing until you hit the ground, granted that you know how to guide your giant parasol.

This is entirely a matter of proper manipulation of the shroud lines, whereby you are able to pull the side of the 'chute in the direction you want to slip, assuming that the wind is not blowing particularly hard. In thus maneuvering your shroud lines you also are able to increase your rate of descent since a parachute works on the principle of a column of air massed directly underneath the lifeboat of the air.

Different jumpers have their own individual methods of leaping from a plane, but I believe that it is possible to make this generalization: if you are in an open cockpit plane, then stand where the trailing edge of the lower wing fastens on to the fuselage, forming a V, and dive towards the tail, fall as far as you desire, and then release the 'chute. On the other hand, if you are in a cabin type of closed plane, you simply dive straight forward out the door.

"WE SET OUR GOAL AT $5000 A YEAR"

"Six years ago we sat down to figure what we wanted from life—Margaret and I. And to reach the comfortable scale of living we had set our hearts on, we found it would take $5000 a year! That seemed impossible, it was so much more than I was making, but Margaret had faith that I could do it.

"I enrolled with the International Correspondence Schools and started studying at home. At once I gained a new and wider view of my job—did better work. After four months the boss asked what had happened to me, and I told him. That day I got the first of my promotions.

"We passed the $5000 mark this year and we're going right on. Thanks to my I. C. S. training I can give my family an attractive home, a good car, all the comforts they need. It means school and college for the boys, more leisure for Margaret, and vacation trips for all of us. Do you wonder we're boosters for the I. C. S.?"

Is your family budget cramped by your salary? In one hour a day of your spare time, the I. C. S. can help you to climb out of the rut and into a bigger, better-paying job. Set your own goal. We can help you reach it. *Today* take the first step.

MAIL THE COUPON FOR FREE BOOKLET

INTERNATIONAL CORRESPONDENCE SCHOOLS
"The Universal University"
Box 2346-G, Scranton, Penna.

Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject *before* which I have marked X:

TECHNICAL AND INDUSTRIAL COURSES

☐ Architect	☐ Automobile Mechanic
☐ Architectural Draftsman	☐ Plumbing ☐ Steam Fitting
☐ Building Estimating	☐ Heating ☐ Ventilation
☐ Wood Millworking	☐ Sheet Metal Worker
☐ Contractor and Builder	☐ Steam Engineer
☐ Structural Draftsman	☐ Steam Electric Engineer
☐ Structural Engineer	☐ Civil Engineer
☐ Electric Wiring	☐ Surveying and Mapping
☐ Electrical Engineer	☐ Refrigeration ☐ Highway Engineer
☐ Electric Lighting	☐ R. R. Locomotives
☐ Welding, Electric and Gas	☐ R. R. Section Foreman
☐ Reading Shop Blueprints	☐ R. R. Bridge and Building Foreman
☐ Telegraph Engineer	☐ Air Brakes ☐ Train Operation
☐ Telephone Work	☐ Highway Engineering
☐ Mechanical Engineer	☐ Chemistry ☐ Pharmacy
☐ Mechanical Draftsman	☐ Coal Mining Engineer
☐ Machinist ☐ Toolmaker	☐ Navigation ☐ Boilermaker
☐ Patternmaker	☐ Textile Overseer or Supt.
☐ Pipefitter ☐ Tinsmith	☐ Cotton Manufacturing
☐ Bridge Engineer	☐ Woolen Manufacturing
☐ Bridge and Building Foreman	☐ Agriculture ☐ Fruit Growing
☐ Gas Engines ☐ Diesel Engines	☐ Poultry Farming ☐ Radio
☐ Aviation Engines	☐ Marine Engineer

BUSINESS TRAINING COURSES

☐ Business Management	☐ Business Correspondence
☐ Office Management	☐ Lettering Show Cards ☐ Signs
☐ Industrial Management	☐ Stenography and Typing
☐ Personnel Management	☐ Complete Commercial
☐ Traffic Management	☐ Civil Service ☐ Mail Carrier
☐ Accountancy ☐ Cost Accountant	☐ Railway Mail Clerk
☐ C. P. Accountant	☐ Grade School Subjects
☐ Bookkeeping	☐ High School Subjects
☐ Secretarial Work	☐ College Preparatory
☐ Spanish ☐ French	☐ Illustrating ☐ Cartooning
☐ Salesmanship ☐ Advertising	☐ Lumber Dealer

Name .....

Address .....

City ..... State .....

Occupation .....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

Building the Georgias Special

(Continued from page 143)

the hole and around the tubing. This is later doped.

The bottom and top turtle decks are built up and mortised into formers. They are bolted to the longerons and cross bracing by small aluminum clamps that go all the way around the tubing, bolting into the spruce formers.

Seat

This is made from a piece of 16 gauge aluminum secured around the top horizontal bracing of the third bay of the fuselage. A wood former is placed on the floor board. This piece of board is determined by the size of the person who is to fly the ship and a little "self designing" must be used there.

Fire Wall

This is a very important part of the ship so care must be taken in fitting it to the front part of the fuselage. It is built of 18 gauge aluminum and has as small openings as will just let the necessary gas and oil and other necessary instrument accessories through. Right here let me say that the gas and oil lines should have a piece of rubber tubing placed over them where they go through the fire wall so that vibration will not chafe the lines and cut through.

The Landing Gear

The landing gear is the most important part of the ship when you come into land so must be built with the most exact care. It is best built with the ship leveled up and in the correct distance from the ground. Then the correct diagram placed on the floor directly underneath, the tubes cut and placed in their respective places.

The stub axle as you see from the drawing should be first built up, bent and welded into the false axle which goes up to the top of the gear. The shock cord is attached to the cross member, the gear is reinforced down at the attachment with the stub axle with 16 gauge sheet steel 6" up from the stub axle inner washer on both sides.

The wheels can be streamlined if you like with cloth, and doped, but is not necessary. Use ½" shock cord. It takes 3 feet for each side.

Tank

This should be built with tern plate and no dimensions are given, because each per-

son wants a different capacity. Its location is shown. Unless you are very good with a soldering iron and solder I would advise you get it built by a local tinsmith.

Propeller

This should be bought from some of the propeller companies for best results. A ship has been built from these plans using a 28 h.p. Lawrence-Hickman conversion.

Cowling

This can make or break the looks of the plane, and extra care should be used in making this. A great deal of ingenuity must be used here for the correct lines of the ship depend on the correct cutting of the aluminum. There is no beating to be done on this cowling. The fuselage cowling can be cut from one piece and the cockpit cut out in its proper place. The motor cowling is in one piece on the bottom and two on top, bolted together with 3/16" stove bolts.

Ribs

You will see that the ribs are made from pieces of ¼"x5/16" spruce, fastened together with airplane glue and ⅜" by 20 gauge flat head nails. Use 1/16 gusset plates; these gusset plates are best determined in size by the place they go. The outline of the rib should be placed on a smooth piece of board and outline caps placed so as to hold the form of the rib when nailing the gussets, also all of the internal bracing of the wing should be outlined with outline caps so as to hold the bracing while being glued and nailed. After the one side is glued and nailed take out of the jig and turn over and glue and nail the gusset on that side.

The Wing Beams

These are made intentionally solid. For the amateur, I beams are a little too difficult and often the professional makes mistakes with them; therefore, solid beams of the best selected spruce must be clear grained, no knots, pitch pockets, and straight grained, with at least 10 annular rings to the inch.

Cut the beams very carefully, follow the drawings, and you cannot go wrong. It is best to cut the beams just a little large and then plane down to right size, making sure not to get them too little as that is the first step to heaven.

Aileron Attachment Beam & Aileron Beam

These are made solid. Follow very carefully drawings of same. Mortise the aileron attachment beam for the ribs and place the

HOME OWNERS WANTED

To Introduce World's Lowest Priced POWER OIL Burner

Make BIG MONEY selling World's lowest priced power oil burner, Laco Jr., the one and only mass market burner —on easiest terms—at lowest price. Heats 2 to 8 rooms! Fits Arcolas, Heatrolas, Stoves, and Small Furnaces. Can be attached to water heater. Operates on as little as ½ pint of cheap distillate an hour. Laco patented Mineral Wick—burns oil and gas—stops fuel waste. Saves time, labor, and furnace drudgery. Comes complete, instantly installed. Anybody can do it. Simple to operate. Safer than gas or coal. Nothing to get out of order.

HOT WATER THE YEAR AROUND

HEATS 2 to 8 ROOM HOMES

Fast, Even, Safe Heat For As Little As $70.00

Sells fastest because of sensational low price and economical operation. Specially equipped with amazing safety features that prevent flooding. Gives quick heat, even temperature, and is safeproof against mistakes in turning on or off. Runs partially efficient even when electricity fails. Nationally advertised. Guaranteed. Easy payments. BIG OPPORTUNITY. Special Offer if you act now! Get low price, Free folder, and complete Laco money making agency plan.

LACO OIL BURNER COMPANY
2813 Union St., Griswold, Iowa, U.S.A.

MUSCLES of STEEL

NERVES of IRON

Take STRENTHNER morning and night for two weeks and watch your strength grow. Money refunded if not delighted with results.

Send only $1 for two weeks' supply

STRENTHNER

Dept. D-21, Suite 860, Caxton Bldg., Chicago, Illinois

$1260 to $3400 Year
Men—Boys—18 Up
STEADY WORK
Paid Vacations
Common education usually sufficient
Mail coupon today—SURE

COUPON

FRANKLIN INSTITUTE,
Dept. L-315, Rochester, N. Y.
Gentlemen: Rush to me FREE of charge, list of U. S. Government big pay positions now obtainable. Send me FREE 32-page book describing salaries, hours, work, vacation and giving full particulars on how to get a position.

Name .....

Address .....

Learn AVIATION
WHERE LINDBERGH LEARNED!

Big Opportunities for Lincoln-Trained Men

Start in Aviation at Lincoln — where "Lindy" began. Come to the famous Lincoln School—**approved by the U. S. Dept. of Commerce as Transport, Limited Commercial and Private, both Ground and Flying School.** No other civilian air school in America offers such complete intensive training on such elaborate equipment—at anywhere near our reasonable tuition charge.

Exceptional Facilities—Over $250,000 worth of buildings and equipment. A modern $100,000 airport. Government-licensed instructors and all types of modern production planes—including a new Travel Air Transport Ship.

Complete Training for private, limited commercial and transport pilot's licenses. Complete mechanic's courses—with instruction on real planes, as we are tied right in with a large commercial aircraft factory. Part time employment offered students.

Catalog on Request—Write Today!

LINCOLN
Airplane & Flying School
408 Aircraft Bldg., Lincoln, Nebr.

DRAFTING
BOOKS SENT FREE!
ON APPROVAL

Only fifteen minutes a day with these WONDER BOOKS will prepare you for a good Drafting job in less than a year! Mechanical and Architectural Drafting from simple straight lines to important, complex plans, *a step at a time!* Built especially for beginners, for men with only grammar schooling. Drafting room practice *plus engineering* man-easy and clear!

For Beginners
Written so you can understand every word, by 18 famous Engineers and Architects. Deluxe, flexible binding. 1750 pages, 1050 blue prints, charts and diagrams. Prepares you for a good Drafting job in mechanical or architectural lines. Sent for 10 days' free use, if you mail coupon immediately.

"Blue Print Reading"

"Architectural Plates"

Big Field—Big Demand—Big Pay!
Competent Draftsmen are urgently needed right now in all building and manufacturing lines at $50 to $100 a week. That's just the beginning—*for draftsmen have the best chances for advancement!* Pleasant, fascinating work, easy to learn and do. Learn quick with these books—send coupon for a set FREE, and see for yourself!

A year's Consulting Membership in the American Technical Society now given free to all readers of this famous Cyclopedia of Drafting. Many say that's worth more than cost of books.

American Technical Society
Dept. D-6320, 58th & Drexel Ave., Chicago

FREE If you send for these great Drafting Books NOW we will include without cost a complete volume "Blueprint Reading" containing 120 pages durably bound in cloth, and also a complete portfolio of 58 plates covering the basic orders of architecture. These plates are drawn to scale and are very valuable.

American Technical Society
Dept. D-6320, 58th & Drexel Ave., Chicago
Send for 10 days' free use 4-volume set of **DRAFTING.** In return for mailing this coupon promptly send absolutely FREE **"Blueprint Reading"** (Building) 120 pages, 69 illustrations, also a complete portfolio of 58 plates. I will pay the few cents delivery charges. If I wish I may return books in 10 days and owe you nothing. But if I prefer to keep them I will send $1.80 after 10 days, then $2.00 a month until $14.80 (special reduced price) is paid.

Name .....
Address .....
Employed by .....
Address .....

safety plywood gussets as per drawing. Securely glue and nail these attachment ribs and gussets. Use ¾" by 20 gauge flat head nails for this, also for attaching the rib ends to aileron attachment spar.

The aileron spar is built the same way by mortising the ribs into the beam and gluing and nailing with ¾" by 20 gauge flathead nails, and placing little triangular spruce pieces glued, together with nails on each side of the aileron rib at its attachment to the spar.

The aileron is made up very easily. It consists of the aileron spar and ribs cut off of the regular ribs at the aileron space. A trailing edge of aluminum shaped in a "V" shape is slipped over the ends of the ribs. Be sure that the aileron lines up when the hinges are placed on, and that the trailing edge of the aileron is in line with the wing. A web of ⅛" plywood is applied to the inner end rib of the aileron and to the adjacent end of the common rib at the inner end of the aileron opening in the wing.

Internal Wood Bracing of Wings

Three-eighths-inch by ⅜" wood braces are applied inside the wings as shown in the drawings. First the wooden blocks are nailed and glued to the members to be united by a brace, then the brace is nailed and glued both to blocks and the members to be joined together.

Compression Struts

These are pieces of ⅜"x¾" spruce nailed on each side of the regular rib, also glued at each place, and nailed. You will need 10 of these and 18 regular ribs.

Leading Edge

This is made of a piece of 1½"x1½" spruce 13 feet long, planed to required size which is determined from the wing profile that you laid out on the rib jig. Secure this to the ribs with ⅜"x⅜" wooden blocks, glued, and lots of small nails.

Trailing Edge

This is made of a two-inch piece of 24 gauge aluminum, nailed after it is formed, into a "V" shape onto the tips of the ribs.

Aileron Control Pulleys

These are secured at their respective places as shown on the drawings.

Aileron Horn

This is made up as shown by drawing.

Care should be used to get the attachment bolts good and tight, but do not crush the wood fibers by getting *too* tight.

Wing Tips

The wing tip is elliptical in form and ½" steel tubing to form this curve. It is attached to the leading edge, spars, and aileron attachment spar by strips of copper. Nail and solder the nail heads to the copper strip.

Wing Struts

They are made up of 1 inch by 20 gauge seamless steel tubing and streamlined with spruce and taped. Then dope them. They are adjustable on one end for rigging purposes.

Assembling

In assembling this ship, first put on the tail surfaces and be sure that they are bolted and all nuts cottered, then put the control wires in and determine where the wires will come out of the fuselage covering so that you can put little leather patches where they come through.

Covering of the Ship

This procedure is carried out as an envelope method wherever possible and the open edges hand sewed. Five coats of dope clear are used and pigment color that the builder desires. The wings should be sewed before they are doped, every four inches between the spars and around the ribs. After the first coat of dope the ribs must be taped over and the leading edge and the trailing edge, control surfaces are taped over each rib, but it is not necessary to sew the cloth to the ribs in this small plane.

Balancing the Plane

To correctly balance the plane put the fuselage with all parts assembled on a knife edge made from a 2x4 with the weight of the pilot in the cockpit and gas and oil in the motor, then place the wing by rigging the center section struts till the center of lift comes right over the place that the plane balances. In the Clark "Y" airfoil the center of lift is 42% from the leading edge. The bottom part of the airfoil must be level with the top longeron as the wing curve is set at "0" degrees for the best efficiency.

Then be sure that the wings are exact laterally—this ship should be flown without any dihedral, and the wash in on the wing tips will best be determined by flight. Adjust till the ship will fly hands off and have no tendency to fall off on one wing or the other.

ON TOP OF THE WORLD

That's how you feel when you Fly a Mead Glider! As you float smoothly over the launching-crew and the flying-wires whisper their song of safety, you are thrilled with a new sensation. Your Rhon Ranger controls so easily that you can talk to your friends on the ground. **$89.50**
And you can BUILD IT YOURSELF for only
The Rhon Ranger Kit contains every item used on the glider, from the tiniest nail to the last coat of dope; every part is numbered; you can't make a mistake. Send 10c today for illustrated literature describing this

Superb Training Glider!

MEAD GLIDERS

Dept. F. 12 So. Market St. Chicago, Ill.

LEARN TO PAINT SIGNS & SHO CARDS!

Complete instruction book written in plain language called **"HOW TO PAINT SIGNS AND SHO' CARDS"** teaches you this money-making trade easily, quickly. No talent or experience required. Earn good money spare or whole time. **EXPLAINS EVERYTHING.** Alphabets, Colors, **HOW TO MIX PAINTS,** Show Cards, Window, Board and Wall Signs, Ready-made letters, Gilding, **TRICKS OF THE TRADE,** etc. Contains 100 alphabets and designs. **SPECIAL OFFER: FOUR BALL BEARING SHOW CARD PENS FREE** if ordered at once.

SEND NO MONEY

Just send your name and address. We'll send this remarkable book with pens at once. On arrival pay postman only $2.98 plus small delivery charge. Money back in 5 days if not pleased. **Price outside of U. S. $3.20 Cash with order.**

Globe Publishing Co., Div. 31, Syracuse, N. Y.

NEW! Automatic Power Burner for Heavy Oil

LACO Model F

BURNS CHEAP FUEL OIL WITHOUT WASTE

Now, no matter where you live, enjoy luxurious automatic oil heat at amazing low cost. Laco Model F burns cheap fuel oil and 24 West Coast Diesel Oil. Specially designed combustion chamber solves fuel waste problem—scientifically extracts every degree of heat from every drop of oil—metering it drop by drop. Burns a slow, low pressure, lazy flame, in spiral direction, not a shooting flame that blows the heat out the chimney. Every particle of oil is caught and burned. Not an atom wasted. That's the reason Laco Model F gives clean, even heat, without waste! Without soot, or carbon, or smoke!

QUIET, AUTOMATIC

Fully equipped with electric ignition, automatic controls — room thermostat, safety lock-out system, stack switch. Operates so quietly you're never aware of it. Rubber cushioned against vibration. Colorfully finished. Only one moving part. So simple, so economical, so low priced it doesn't pay you to bother with the responsibility and labor of coal. Get amazing low price, SPECIAL OFFER, and full information now!

LACO OIL BURNER COMPANY
2013 Union St., Griswold, Iowa, U.S.A.

AMAZING OFFER

We want dealers for Laco Model F everywhere, and will make you sensational special offer. You'll have the backing of one of the largest manufacturers in the field, national and local advertising, attractive discounts, and unusual sales helps.

ACT NOW!

Fastest selling because lowest priced burner of its kind. In great demand. Act now! Get our special discounts, and money making franchise.

9" x 2½" Lathe

Price $163

Work this Lathe Will Do

— Machine armatures — Make bushings
— Reface valves — Machine pistons
— Undercut Mica — Cut threads
— Bore, file, drill, turn, lace, grind, polish and hundreds of other jobs.

$1 A MONTH

41 for 9"x2½" LATHE

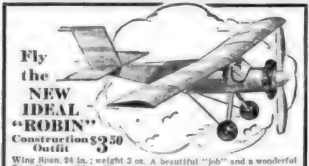
Use this famous New Model South Bend Jr. Lathe while you pay. It is a Back Geared Screw Cutting Precision Tool. Same high quality throughout as our other Lathes used by Studebaker, General Motors, Ford, General Electric, Radio Corporation, Westinghouse and others.

Lathe comes complete with equipment. Weight, 350 lbs. Write for Free Catalog.

"How to Run a Lathe" 25c Postpaid

Latest edition of this famous work. Simplest, most complete and practical book on lathe operation. Contains 111 pages, fully illustrated. Shows how to handle all classes of work on the lathe. Sent postpaid for only 25c. Coin or Stamps or any Country accepted.

SOUTH BEND LATHE WORKS
268 E. MADISON ST., SOUTH BEND, IND., U.S.A.



Fly the NEW IDEAL "ROBIN"

Construction Outfit $3.50

Wing Span, 24 in.; weight 3 oz. A beautiful "job" and a wonderful flyer. Demountable, adjustable wings, balsa propeller, large landing wheels, dummy motor, tremendous power for long, fast flights. Construction is easy, quick. Ask your Dealer or order direct from us.

Big Catalog Models and Supplies—5c

IDEAL AEROPLANE & SUPPLY CO., Inc.
26-28 West 19th Street New York City

ENGINEERING IN 2 YEARS

B.S. degree in Aeronautical, Civil, Electrical, Mechanical, Chemical and Administrative Engineering. Intensive courses, half usual time. Students who left high school can make up work. Living costs and tuition low. Enter classes Sept., Jan., March or June. *Ask for catalog.*

698 College Street, ANGOLA, INDIANA

TRI-STATE COLLEGE

BURNS OIL and AIR and SAVES ½ FUEL COST

Only $216.00 Completely Installed

DEALERS REPORT BIG SALES

Everywhere, men with or without oil heating experience, are cleaning up big money. Griswold mosts Instant approval, and sells because of low price and low cost to heat. Even the smallest home is your prospect.

Amazing Offer

Get in right now. The BIG selling months are ahead. To help you start, we're ready to make an astounding offer. Write us today without fail!

No More Shoveling Coal and Ashes

Goodbye winter worries. Here's automatic oil heat so cheap you can't afford coal. Amazing new way burns oil and air—patented crystal wick—does it. Changes oil into hydro-carbon gas, and eliminates fuel waste. All the oil burns, and there's no soot, smoke, or odor. Cuts fuel costs. Fits any stove or furnace instantly, whether home, factory, apartment—hot water air, steam, or vapor system. No complicated wiring—no ignition system. Anybody can install it in a few hours. Safe and easy to operate.

Clean Healthful Heat

Put it in and let the thermostat be your janitor. Enjoy clean, even heat at no extra cost. Fully automatic —fully safeproof, because you can't flood it. Oil fed by the siphonic feed valve principle. Quiet. Guaranteed. Meets all city requirements. Send right now for our easy payment plan FREE Descriptive Folder, and SPECIAL OFFER to dealers.

Manufactured by
GRISWOLD DIVISION
LACO OIL BURNER CO.
2813 N. Union St., Griswold, Iowa
U. S. A.

Radium is Restoring Health to Thousands

No medicine or drugs. Just a light, small, comfortable, inexpensive Radio-Active Pad, worn on the back by day and over the stomach at night. Sold on trial. You can be sure it is helping you before you buy it. Over 150,000 sold on this plan. Thousands have written us that it healed them of Neuritis, Rheumatism, High Blood Pressure, Constipation, Nervous Prostration, Asthma and other respiratory disorders, Heart, Liver, Kidney and Bladder trouble, etc. No matter what you have tried, or what your trouble may be, try Dermo's Radio-Active Solar Pad at our risk. Write today for Trial offer and descriptive literature. Radium Appliance Co., 458 Bradbury Bldg., Los Angeles, Cal.

QUIT TOBACCO

No man or woman can escape the harmful effects of tobacco. Don't try to banish unaided the hold tobacco has upon you. Join the thousands of inveterate tobacco users that have found it easy to quit with the aid of the Keeley Treatment.

KEELEY Treatment For *Tobacco Habit* Successful For Over 50 Years

Quickly banishes all craving for tobacco. Write today for Free Book telling how to quickly Free yourself from the tobacco habit and our Money Back Guarantee.

THE KEELEY INSTITUTE
Dept. D-722 Dwight, Illinois

WANTED MEN

To Manufacture Metal Toys and Novelties

Big demand for 5 and 10c store Novelties, Ashtrays, Toy Soldiers, Animals, Auto Radiator Ornaments, etc. We cooperate in selling goods you make; also buy these from you. Small investment needed to start and we help you build up. WE FURNISH COMPLETE OUTFITS and start you in well paying business. Absolutely NO EXPERIENCE and no special place needed. A chance of a lifetime for man with small capital. Write AT ONCE if you mean strictly business and want to handle wholesale orders now being placed.

Metal Cast Products Company

Dept. 2 — 1696 Boston Road — New York City

RADIO FREE CATALOG

NEW SCREEN GRID SETS

Rock-bottom Prices

Everything in radio at lowest rock-bottom prices—NEW 1931 SCREEN GRID, A.C. HUMLESS ALL-ELEC TRIC SETS—remote control, public address, phone combinations—all dynamic speaker equipment. Attractive Consoles. Real values in accessories, parts and kits.

Most complete catalog in radio—160 pages of unusual price values. Write for it today!

ALLIED RADIO CORPORATION

711 W. LAKE ST. Dept. 60 CHICAGO

MAGIC

Amaze and Mystify your friends. Be popular—Learn to entertain. "The Book of 1000 Wonders" tells how. Explains many coin, card, handkerchief tricks, etc., you can do. 100 pages, profusely illustrated. Postpaid, 10 cents.

LYLE DOUGLAS, Station A-4, Dallas, Texas

"How can I get into Aviation?"

Read this Answer from

A World Famous Trans-Atlantic Pilot

TO succeed in Aviation—to make BIG MONEY—it is not necessary to be a pilot. There will have to be thousands of pilots, of course. But for every plane that flies, there's an immediate need for forty trained men to fill important jobs right on the ground. There have to be construction, motor and instrument experts—managers, service foremen, salesmen—and skilled craftsmen of almost every kind. All of these jobs pay big money—all of them are stepping stones to still bigger money. Aviation offers more opportunity for good starting salaries and rapid advancement than any other field. It's the world's fastest-growing industry. And NOW, while there are plenty of places on the "ground floor"—is the time to get into it.

Get Your "Ground Work" NOW—

Walter Hinton Will Train You At Home

Walter Hinton, the world-famous Trans-Atlantic pilot, will train you QUICKLY—right at home—for a big-pay place in Aviation. In a course of instruction which even astonishes the most remarkable ever produced, now he will give you the facts about plane construction, motors, theory of flight, navigation, instruments, and a whole lot more. He gives you the practical knowledge you need to fill ANY job in ANY branch of Commercial Aviation. Furthermore, he helps you get that job—helps you turn his training into actual cash. All over the country, men who are now actively engaged in Aviation owe their start and their success to Hinton. Get the facts QUICK. Find out how he can train and start YOU. Mail the coupon NOW.

Aviation Institute of U.S.A., Inc.

Walter Hinton, *President*

1115 Connecticut Ave., Washington, D. C.

Get This FREE Book

If you are 18 or over—if you are serious about wanting to get into Aviation—then clip, fill-in and mail the coupon below. It brings your Free copy of Hinton's new Book, "Wings of Opportunity."

Mail Now for Facts

Walter Hinton, President (322-M)
Aviation Institute of U. S. A., Inc.
1115 Connecticut Av., Washington, D. C.

Please send me at once your FREE Book, "Wings of Opportunity," showing how I can get into this tremendous field.

Name .....

Street ..... Age ..... (Must be over 18.)

City ..... State .....

Amazing Offer on Brand New

Books just off the press, which cover every phase of Modern Shop Practice. These seven big books contain over 2600 pages, nearly 2000 illustrations and are bound in special gold stamped flexible covers. Everything that any mechanic could possibly be interested in is explained in detail and in simple language that anyone can understand. Machine shop work, machine set-ups, machine repairs, mechanical drawing, metallurgy, forging, shop arithmetic, tool making, pattern making and hundreds and hundreds of other items, any one of which is worth the special price of these books.

Shipped FREE Anyone doing mechanical work of any kind can have these books shipped for examination without one penny down. If you want to fit yourself for a raise in pay, if you want to make yourself worth more money, if you want to be a tool maker, pattern maker, shop foreman or factory superintendent don't fail to look these books over. We mean just what we say, they will be sent to you absolutely free. Don't send us a penny, just your name and address. After you receive the books, then decide whether or not you want to keep them. This is the best way to prove that these U. P. TO THE MINUTE books should be in every mechanic's hands and that they are worth at least ten times their price to you.

JIFFY INDEX

Don't waste time. Don't study long hours to get a result; the Jiffy Index puts fastest your finger tips instantly

American Technical Society, Dept. S-6320
Drexel Ave. at 58th St., Chicago, Ill.

Send the seven volumes, Modern Shop Practice, FREE. If I decide to keep them I will send $2.00 in 10 days and then only $3.00 a month until the special sale price of $29.80 is paid. Otherwise I will return the books and owe you nothing. By sending now I will get a free membership in the American Technical Society entitling me to free consultation privileges for one year by letter or wire with 18 experts.

Name .....
Address .....
Reference .....

3. What are the advantages of monoplane construction? (See page 84)

NEW INDUSTRY NEEDS MEN

ELECTRIC REFRIGERATION Calls You! Newest American Industry needs men for $200 to $1,000 a month jobs in production service, Installation and sales. Fastest growing, money-making field—backed by General Motors, General Electric, etc. Now learn home training qualifies you for big pay job. This training endorsed by Servel, Kelvinator, Copeland and other leading manufacturers.

Get Valuable New Book—FREE

Our new illustrated book—*Rich Rewards in Electric Refrigeration*—just off the press, reveals amazing plan to ambitious men. Sent absolutely free, without obligation. Be the first in your locality to get into this new magic industry. Write today!

UTILITIES ENGINEERING INSTITUTE
Dept. 090, 4483 Sheridan Road, CHICAGO, ILL.

How to Preserve Injured Trees

(Continued from page 123)

mits a rapid, uniform growth of new bark, over the filling. Usually the sap flows in straight lines up and down the trunk and along the limbs. Occasionally, however, its course twists and curves, and in such cases, the edges of the cavity must be twisted and curved accordingly. The course of the flow is indicated by the grain of the wood.

In outlining the cavity, the tree surgeon also makes sure to shape it so that the top and bottom will terminate in sharp points. These points so divert the sap flow that there will be even healing along both sides.

After the cavity is outlined and the edges of the bark traced, the tree surgeon begins to remove the decayed and infected wood. This is the laborious phase of the operation, particularly if the wood is tough and hard. Sometimes the wood is removed with a hammer and chisel; sometimes air driven tools are used. The same results are obtained by either means.

When the cavity is opened, the true extent of the decay is revealed. The mass of rotten wood can be seen and also the infected wood, still solid, through which the fungi have permeated in much the same way as mold works its way through a Roquefort cheese. All this rotten and infected wood is removed; the surgeon does not stop until he is positive the opening is as clean as the proverbial hound's tooth.

If the cavity opening is comparatively small, a concrete filling alone is sufficient to restore the tree's structural strength. In many cases, however, it is necessary to supplement the filling with reinforcing rods. After the reinforcing rods are in place, the tree surgeon carefully disinfects the walls of the cavity with a strong solution to kill any fungi spores which may have gotten there during the progress of the operation. He next applies a waterproofing solution and when that is on, he is ready to put in the concrete filling.

The concrete filling is made in sections and these sections function in much the same way as the vertebrae of a person's backbone, providing strength and yet yielding to twisting and bending.

In making the filling, the tree surgeon puts in a layer of concrete at the bottom of the cavity. He then puts in a layer of joint material; then another section of concrete and then another joint.

A GENUINE 240 POWER MICROSCOPE! Sent for Only $1.00 DOWN

An educational and entertaining instrument that enables all to see and know life invisible to the naked eye. Thrills and fun galore! See tiny bugs grow to proportions of great elephants. See plant and mineral life reveal amazing wonders in form and color. Made just like microscopes used by physicians, scientists. Now only $3.95. Could easily sell for $10 and $20 more. Adjustable lens of 240 power!

Ideal for Students!

A wonderful help in studying science, botany, etc. Never before has such a wonderful instrument been offered at such an amazingly low price of $3.98. **ORDER TODAY! Send only $1** Pay balance ($2.98 plus postage) when postman delivers. If not satisfied return in 5 days and your money will be refunded!

DEALERS AND TEACHERS WRITE FOR OUR PROPOSITION

R.B. SPECIALTY CO., Dept. T-346 220 E. 3rd St., Cincinnati, O.

TOBACCO HABIT BANISHED

FOR THOUSANDS OF MEN

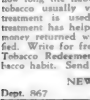
QUICK, SURE, LASTING RESULTS

In most cases **Tobacco Redeemer** relieves craving for tobacco completely in a very few days. An absolutely safe, dependable, and thoroughly reliable treatment. No matter how long the habit, or in what form used, all craving for tobacco usually vanishes when this pleasant, inexpensive treatment is used according to simple directions. The treatment has helped thousands and should help you. Your money returned without argument or question if not satisfied. Write for free explanatory booklet and proof of what **Tobacco Redeemer** has done for men addicted to the tobacco habit. Send post card or letter today.

NEWELL PHARMACAL CO.

Dept. 867 Clayton Station St. Louis, Mo.

HOT PIANO



Ultra-modern Piano taught by mail. Note or Lesson. Easy rapid lessons for adult beginners. Also Self-instruction system for advanced pianists. Learn 250 Bass Styles, 976 Jazz Breaks, hundreds of Trick Endings, Hot Rhythms, Rock, Stomp and Dirt Effects; Symphonic and Wicked Harmony in latest Radio and Dance Styles. Write for Free Booklet.

WATERMAN PIANO SCHOOL

1830 W. Adams St. Los Angeles, Calif.

AGENTS-Represent the Carlton LINE

America's Best Paying Proposition!

SELL FROM A MILLION DOLLAR STOCK

Shirts, Neckwear and Underwear.
No Substitutions, 4 Hour Shipping Service, Highest Commissions Bonuses, Profit Sharing. Biggest Company, Mail Coupon.

CARLTON MILLS, INC 79 FIFTH AVE. NEW YORK

Dept. 521-P

MAIL COUPON

"The Boss Didn't Even Know My Name"

"He said my face was more or less familiar and he remembered seeing me around, but he didn't even know my name until the I. C. S. wrote him that George Jackson had enrolled for a course of home study and was doing fine work.

"'Who's George Jackson?' he asked. Then he looked me up, Told me he was glad to see I was ambitious. Said he'd keep his eye on me.

"He did too. Gave me my chance when Frank Jordan was sent out on the road. I was promoted over older men who had been with the firm for years.

"My spare-time studying helped me to get that job and to keep it after I got it. It certainly was a lucky day for me when I signed that I. C. S. coupon."

Your much longer are you going to wait before you take the step that will bring you advancement and more money?

It takes only a moment to mark and mail this coupon and send it to the International Correspondence Schools at Scranton, but that one simple little step may change your entire life. Isn't it best to do this today than to wait a year from today and then wish you had?

Mail the Coupon for Free Booklet

INTERNATIONAL CORRESPONDENCE SCHOOLS

The Universal University

Box 2325-C, Scranton, Penna.

Without cost or obligation, please send me a copy of your booklet, **"Who Wins and Why,"** and full particulars about the course *before* which I have marked X in the list below.

TECHNICAL AND INDUSTRIAL COURSES

☐ Architect	☐ Automobile Mechanic
☐ Architectural Draftsman	☐ Aviation Engines
☐ Building Foreman	☐ Plumber and Steam Fitter
☐ Concrete Builder	☐ Plumbing Inspector
☐ Contractor and Builder	☐ Foreman Plumber
☐ Structural Draftsman	☐ Heating and Ventilation
☐ Structural Engineer	☐ Sheet-Metal Worker
☐ Electrical Engineer	☐ Steam Engineer
☐ Electrical Contractor	☐ Marine Engineer
☐ Electric Wiring	☐ Refrigeration Engineer
☐ Electric Lighting	☐ R. R. Positions
☐ Reading Shop Blueprints	☐ Highway Engineer
☐ Telegraph Engineer	☐ Chemistry
☐ Telephone Work	☐ Pharmacy
☐ Mechanical Engineer	☐ Coal Mining Engineer
☐ Mechanical Draftsman	☐ Navigation ☐ Assayer
☐ Machine Shop Practice	☐ Iron and Steel Worker
☐ Toolmaker	☐ Textile Overseer or Supt.
☐ Patternmaker	☐ Cotton Manufacturing
☐ Civil Engineer	☐ Woolen Manufacturing
☐ Surveying and Mapping	☐ Agriculture ☐ Fruit Growing
☐ Bridge Engineer	☐ Poultry Farming
☐ Gas Engine Operating	☐ Mathematics ☐ Radio

BUSINESS TRAINING COURSES

☐ Business Management	☐ Business Correspondence
☐ Industrial Management	☐ Show Card and Sign Lettering
☐ Personnel Management	☐ Stenography and Typing
☐ Traffic Management	☐ English
☐ Accounting and C. P. A. Coaching	☐ Civil Service
☐ Cost Accounting	☐ Railway Mail Clerk
☐ Bookkeeping	☐ Mail Carrier
☐ Secretarial Work	☐ Grade School Subjects
☐ Spanish ☐ French	☐ High School Subjects
☐ Salesmanship	☐ Cartooning
☐ Advertising	☐ Illustrating
	☐ Lumber Dealer

Name .....

Address .....

City ..... State .....

Occupation .....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

AGENTS! SELLS LIKE WILD FIRE

New improved window washer eliminates all muss and fuss wherever there is glass to be cleaned. Approved by Good Housekeeping Institute. Restricted territory to Producers. WRITE TODAY.

CARTER PRODUCTS CORP.
869 Front Street Cleveland, Ohio

LEARN AT HOME

To Make Crowns, Plates, Bridgework, etc.

FOR DENTISTS

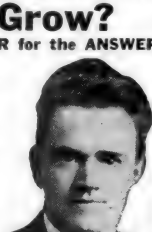
New, easy practical way to learn mechanical dentistry at home in spare time. Full equipment of tools and materials included with course at no extra cost. Low tuition. Easy terms.

Write for **FREE BOOK** that describes this money making profession and details of our easy-to-learn home study course and special offer. Write today.

McCarrie School of Mechanical Dentistry
1340 S. Michigan Avenue Dept. E-484 Chicago, Ill.

What Made His Hair Grow?

Read HIS LETTER for the ANSWER



Mr. H. A. Wild, whose photograph appears at the left, is among those who acknowledge complete satisfaction from the use of Kotalko.

"Now hair came almost immediately after I began using Kotalko," he writes, "and kept on growing. In a short time I had a splendid head of hair, which has been perfect ever since."

This statement by Mr. Wild is but one of the many which voluntarily attest that Kotalko has stopped falling hair, eliminated dandruff or aided new, luxuriant hair growth where the roots were alive.

Hair roots that remain in the scalp long after the surface hairs are lost, may regain their original power through proper encouragement. The process of hair growth depends on the hair buds and the nourishment they receive.

Women also report new hair growth through KOTALKO. Many testimonials from men and women whose health was undoubtedly need and whose hair roots were not dead.

Is your physical condition equal to theirs? And are your hair roots alive but dormant? If so, they may be stimulated into growing hair through Kotalko, the right sort of invigorant. Sold by busy druggists.

Free Box To prove the efficacy of Kotalko for men's, women's and children's hair, the proprietors are giving Proof Boxes.

KOTAL CO., D-674, Station O, NEW YORK

Please send me FREE Proof Box of KOTALKO.

Name .....

Full Address .....

.....

A Bicycle Side-Car

(Continued from page 155)

of the seat back we fastened a strip of felt—the binding from the brim of a worn out hat—using brass manuscript clips about six inches apart, and a liberal coat of shellac underneath to glue it to the galvanized iron.

In the final assembly, the bolt hole in the main frame member for the forward end of piece should be permanently located after the side-car wheel is properly aligned with the bicycle wheel. This alignment is important, for a faulty job will cause wear on the side-car tire as well as make it drag in use.

On the original we used two coats of Chinese red lacquer and it made an excellent effect, with the top of the foot-rest painted a slate grey, and balanced by the grey felt binding of the seat. The color, of course, depends on the color of the bicycle it is to be used with.

In turning corners the bicycle rider should use his own judgment in leaning. With a load he will not, of course, travel as fast around corners as alone, but nevertheless there is a tendency to lean considerably. This side car frame has sufficient elasticity to allow for some latitude in turning, but is not intended to be universal in its relation to the bicycle.

A distinct advantage in this open type of side-car is that the passenger can get off instantly in case of an emergency; and he will get a great thrill speeding down the street with nothing to do but enjoy the envy of playmates whose turn is several applications ahead.

PATENTS

PATENTS Procured. Trade Marks Registered. Preliminary advice gladly furnished without charge. Booklet of information and form for disclosing idea free on request.

IRVING L. McCATHRAN, Patent Lawyer
703C International Bldg., Washington, D. C.
41C Park Row New York City

Sell "BONDED" SHIRTS PRESHRUNK COLORFAST

NEW TREMENDOUS DEMAND

Responsible Mf'r Guarantees New Shirts for every one that Shrinks or Fades. Selling like Wildfire. Biggest Profits! Complete line includes Neckwear, Hosiery, Underwear and Jackets. Write

Dept. P-14 BONDED SHIRT COMPANY #1 FIFTH AVE., NEW YORK

WRITE TO-DAY for FREE SAMPLE OUTFIT

Curtiss Hawk Biplane

The Two Foot Curtiss Hawk is a flying model of the fast, maneuverable Army pursuit plane. Flights of 300 feet have been obtained with this model.

The construction is balsa wood. Only the lightest parts are used.

The construction set contains all necessary parts, including cut out body sides, celluloid wheels, two colors of dope for coloring the model, bent wire parts, propeller, etc. All necessary parts on the plan are drawn full size, and the plan and instructions are very complete.

Complete Construction Set	$2.50
Catalog and Model Book	.10

HAWTHORNE MODEL AERO. CO.

Dept. M.M. Hawthorne, N. J.

RAISE CHINCHILLA
AND NEW ZEALAND WHITE
FUR RABBITS
In Your Back Yard
We supply stock and a market for all you raise. 36-page illustrated book and catalog, also copy of FUR FARMING magazine tells how to raise rabbits successfully, all for 10 cents.
STAHL'S OUTDOOR ENTERPRISE CO., Inc.
1087 Outdoor Bldg., Holmes Park, Mo.

Take the Air!

Everybody Sez:

"Better Than The Specialist"

You won't have to go to the great open spaces to get that rural outdoor atmosphere that grandfather speaks of. Phil Potts' masterful discourse on that little weather beaten object that made Home Sweet Home a place to remember packs the punch and gives the laughs.

It Only Costs a Buck

At any news stand or

THE COUNTRY PRESS

P. O. Box 1796 Minneapolis, Minn.

1000 HOTEL POSITIONS OPEN!

HOTELS, restaurants, clubs, apartment hotels, hospitals, institutions, schools and colleges everywhere need trained men. Over 70,000 openings as Manager, Assistant Manager, Steward, Room Clerk, Purchasing Agent, Sports Director and scores of other executive positions paying $2,500 to $10,000 a year open annually in hotels of the United States. Nearly two billion dollars' worth of NEW HOTELS, CLUBS AND INSTITUTIONS being built this year will need over 200,000 trained men and women. Hotels start you at salaries up to $2,500 a year, with living usually included.

Previous Experience Unnecessary

You can have one of these fascinating big-pay positions. Thru our Simplified Spare-time Study Plan we qualify you for a well-paid position. Age is no obstacle—young and old alike can win success. A good grade-school education is all you need.

We Put Our Students in Touch With Positions

We train you and put you in touch with big opportunities. All of your training under the personal supervision of Clifford Lewis, who has been appointed Managing Consultant by over 300 hotels throughout the United States. Our students employed by leading hotels everywhere.

Send today for Free Book, "Your Big Opportunity," explaining our Money Back Agreement and showing how we can train you for one of these splendid positions.

LEWIS HOTEL TRAINING SCHOOLS

Room CP-9101 Clifford Lewis, President Washington, D. C.

The Original and Only School of Its Kind in the World

OPPORTUNITY COUPON

Proof!

Lewis Hotel Training Schools
Room CP-9101, Washington, D. C.

Send me the Free Book "YOUR BIG OPPORTUNITY," without obligation.

Name .....

Address .....

City ..... State .....

Thrilling 3000-foot flight! Loop the loop, barrel rolls, circular flights, etc. Finest and longest flying model ever made. Light, sturdy construction permits repetitive, record-breaking flights impossible with heavy models. Spread 36". KNOCKED DOWN—easy to assemble—materials and instructions furnished. No tools needed—$2.50. Assembled and ready to FLY—beautifully covered in yellow and red. $3.75. SEND NO MONEY! Just order METEOR today. Pay postman upon delivery.
KAHN AIRCRAFT COMPANY
5710 Woodlawn Ave. Dept. 22 Chicago, Illinois

4. Who recently made a westward flight across the North Atlantic? (See page 84)

Model Plane Releases Parachute

(Continued from page 159)

ism may seem somewhat intricate, in reality it is very simple in construction and operation. Briefly, the torque or tension of the wound rubbers holds the parachute in place; when motor rubbers are completely unwound a wire hook releases the parachute weight and a rubber band catapults it from the plane. The principle is illustrated here in detail. First secure a double hook under Frame No. 2. Next secure a slotted brass tube, 3/16 inside diameter and 1¼ in. long to a balsa block under Frame No. 4. Now bend a wire latch or long hook of light piano wire to the shape shown in the drawing and insert in tube. Slip a ⅛ in. flat rubber band over the hook of the latch, and then to the double hook under Frame No. 2. A stout linen thread is tied to the other end of the latch and run through a wire guide on the lower right longeron near the tail. This end of the thread has a small wire hook on it, which engages with a hook on the extension of the rear rubber hook. The latter pulls upward when motor rubbers are wound and in turn holds the parachute weight in the slot in the tube. As soon as the latch in the tube slides forward, the rubber band on the parachute pulls the weight from the slot and shoots it forward from the plane. Its performance is perfect, and the parachute rarely fails to open and float gently to the ground in realistic manner.

The parachute is made up of seven segments of china silk cut to the pattern given and stitched together. Shrouds or No. 8 cotton threads depend from each seam. These should be about 12 in. long and tied to a weight made of one-half of a 32 calibre cartridge ball. A hole is drilled through the weight and a light piano wire inserted, a loop being made in each end.

In painting the plane, a small spray gun gives best results, as it spreads evenly and lightly. With a brush too much weight is added and the job rarely looks smooth. Of course, the old reliable aluminum is effective on the fuselage, emblems and lettering being hand-painted in black.

Wings and stabilizer of blue or orange make a pleasing contrast. The cylinders are painted black, as are the radial dummy vents in the front of the motor block.

Before trying in actual flight, give the ship gliding tests with the rubbers installed.

(Continued on page 202)

ROPED *at* LAST!

The greatest story of the old-time west you've ever read!

Don Diablo

By TOM ROAN

A deadly game, with knives and bullets as trumps, is played to settle the leadership in a den of western outlaws.

In the September

NOW ON SALE

THE BRAND OF THRILLING FICTION

Triple-X Magazine

WESTERN
DETECTIVE
WAR

—Also in the September issue—

BADMEN AT BUCKSHOT
—By HOMER K. GORDON

A TALENT FOR TROUBLE
—By SEVEN ANDERTON

ACE OF DEATH —By JOSEPH FOX

And stories by J. Allan Dunn, H. Bedford-Jones, H. M. Sutherland, E. J. Smithson, P. E. Lehman and others.

If your newsdealer is sold out, send twenty-five cents to Triple-X Magazine, Fawcett Publications, Inc., Minneapolis, Minn., and a copy of the September issue will be mailed to your address at once.

PATENTS

Protect Your Ideas

Write for Instructions, free on request - - or send drawing or model for preliminary examination of Patent Office records

Promptness Assured with Best Results

MILLER & MILLER
PATENT ATTORNEYS
FORMER MEMBERS EXAMINING CORPS., U.S. PATENT OFFICE
263 McGILL BUILDING, WASHINGTON, D. C.

BASHFUL?

"Shame on you!" Are you nervous, embarrassed in company of the other sex? Stop being shy of strangers. Conquer the terrible fear of your superiors. Be cheerful and confident of your future! Your faults easily overcome as you can easily learn to be the fullest. Send 25c for this amazing book.
RICHARD BLACKSTONE, E-339 PLATIRON BLDG., NEW YORK

YOUR FUTURE ASSURED

Now is the time to safeguard yourself against such periods of depression as we have been having. Many good, profitable trades are not subject to hard times or slack seasons—trades meeting everyday human needs, such as Mechanical Dentistry. Your age, circumstances, or lack of experience need not stop you. The way is open to you. A helpful booklet, "Choosing a Trade" will be sent you without cost. Your copy is waiting. Simply ask for Bulletin 62.

BODEE INSTITUTE, 1785 Broadway, N. Y.
1305 N. Broad St., Philadelphia. 85 Court Street, Brooklyn

FREE How To Secure A Government Position

Tells About These and Other Positions

RAILWAY POSTAL CLERK
$1900 to $2700 a Year
POSTMASTER
$1200 to $2500 a Year
CUSTOMS HOUSE CLERK
$1140 to $2700 a Year
INTERNAL REVENUE MEN
$1140 to $2700 a Year
R. F. D. MAIL CARRIER
$1800 to $2000 a Year

FREE BOOK tells how I can help you get a Government Job. For 8 years I was Civil Service Examiner—have helped thousands. If citizen 18 to 50, you can qualify. Send for free book. Write or mail coupon TODAY.

A. R. Patterson, Civil Service Expert, 439 Wisner Bldg., Rochester, N.Y.
Please send me your free book "How to Secure a Government Position."
Name .....
Address .....

Model Plane Releases Parachute

(Continued from page 200)

Sixteen strands of 3/16 in. flat rubber are used in this model, and if dipped in a solution of glycerin and castile soap they will give better results and last longer. Proper adjustment of wing and stabilizer are determined by experiment. Normally, of course, the stabilizer should be horizontal, and the wing set so that the entering edge is about 6½ in. from the end of the nose (not the propeller). The front of the rudder should be set slightly to one side of center to counteract the side pull of the propeller. However, all these adjustments must be worked out in trial. Ships built to the same design vary considerably in performance.

In winding, draw the rubbers out to about three times normal length and use a mechanical winder. Fifty turns with a 4-to-1 winder are about right for a start, and up to 80 after the rubbers are worked in. Always launch into the wind, either when taking off from the ground or launching by hand. Properly built, this big navy model gives a remarkable performance, and is well worth your very best efforts in construction.

Convict Ship Torture Devices

(Continued from page 97)

Australasian colonies, has twice circumnavigated England and Ireland, has made one complete circuit of American ports, and now is on her last scheduled cruise in American waters.

The exhibits on the ship include a branding iron with which convicts were branded on the palms of the hand with a broad arrow. They were chained to a triangle while this operation was being performed. Dangerous prisoners were rendered helpless by the use of a body iron with handcuffs attached. There is an iron straight jacket, and a spiked collar, the chain of which was kept short to keep the convict in a stooping posture. The "silent guard" is a ringed stone of Australian blue granite to which twenty convicts were chained at a time. With wrists and ankles fastened to the flogging frame, the prisoner was at the complete mercy of the convict flagellator.

NEW LOW PRICES

GOODRICH-GOODYEAR
Firestone - U.S.
AND OTHER TIRES

Lowest Prices on Earth!
Thousands of satisfied users all over the U.S.A. Our 15 years of business speaks for itself. This big responsible company will make good. Only reconstructed standard makefires at lowest prices. Guaranteed to give 12 months' service

Don't Delay—Order Today

CORD Tires			BALLOON Tires		
Size	Tires	Tubes	Size	Tires	Tubes
30x3	$2.98	$1.10	29x4.40	$2.95	$1.15
31x3½	2.98	1.10	29x4.50	2.40	1.35
32x3½	2.98	1.15	30x4.50	2.45	1.35
33x4	2.98	1.15	29x4.75	2.95	1.35
34x4	2.98	1.15	30x4.75	2.95	1.39
32x4½	3.20	1.45	31x4.75	3.10	1.39
33x4½	3.20	1.45	32x4.75	3.10	1.40
34x4½	3.45	1.45	29x5.00	3.20	1.40
35x4½	3.45	1.45	30x5.00	3.20	1.45
36x4½	3.45	1.45	32x5.00	3.60	1.65
35x5	4.15	1.70	All Other Sizes		

Send only $1.00 deposit with each tire ordered. We ship balance C.O.D. subject to examination. If cash in full accompanies order, 5% discount. Tires failing to give 12 months service will be replaced at half price.

YORK TIRE & RUBBER COMPANY, Dept. 209
3855 Cottage Grove Ave. Chicago, Illinois

DEALERS WANTED

ENGINE CASTINGS

and Detailed Drawings for Power Models, Air or Water Cooled, 1¼" Bore and Stroke.

Send 10c coin for circular about "Wall Castings."

ELMER WALL
5900 N. Fairfield Ave., Chicago, Ill.

TOBACCO
Habit Overcome Or No Pay

Over 500,000 men and women used Superba Remedy to help stop Cigarettes, Cigars, Pipe, Chewing or Snuff. Write for full treatment on trial. Contains no dope or habit forming drugs. Costs $2.00 if successful, nothing if not. **SUPERBA CO. A-16, Baltimore, Md.**

NEW YEAR — NEW IDEA
PATENT YOUR IDEAS
Call or send me a sketch of your invention. Phone Longacre 3088
FREE Inventors Recording Blank
Confidential Advice
U. S. and Foreign Patents secured by
Z. H. POLACHEK Registered Patent Attorney Consulting Engineer
1234 BROADWAY, NEW YORK

RUPTURED

athletes, swimmers, dancers and men and women doing hard, tiring work have found new comfort and relief wearing the Brooks Appliance with automatic air cushion. Can't be detected under clothing. Retains rupture without gouging springs or hard pads. Each appliance made to measure and sold under absolute guarantee. A vast improvement over hard and unyielding rupture devices. Sent on 10 days' trial. Write for free rupture booklet sent in plain sealed envelope.

BROOKS APPLIANCE CO.
146B State Street, Marshall, Mich.

Let Slamming Doors Pay You UP TO $15 a Day

Amazing invention that ends all trouble, annoyance and expense of slamming doors, and brings fortunes to agents. Just one look at this clever device and the sale is made. Can be installed in a few minutes with just a screw driver. Saves nerves, besides enormous loss through broken glass and wasted fuel. Every office, factory, store, institution, or public building needs one for every noisy door.

Entirely New Principle---Works in Oil

Kant-Slam is different from any other door control. It's not pneumatic, but is built on new oil principle, that controls door like human hand. Gives lifetime service without adjustments. Always efficient in any weather.

Amazingly Low in Price!

Kant-Slam is neat, compact, light in weight and is lowest priced control ever offered with a factory guarantee. Pays big commission that makes agents $15 a day and more, easily, just showing it. Simple demonstrator does all the work. Just take orders and collect the big commissions in ADVANCE!

Clever Demonstrator Offered FREE!

Look! A full sized sample on miniature door furnished every active agent! Can I offer you more than that? An actual working sample mounted on an easy-to-carry, light weight miniature door. With this clever demonstrator you can't fail. Sales pour in, and in just a few minutes' time. Demonstrate this clever device —tell how it saves thousands of dollars each year in foul and broken glass, and you're bound to make good. Mail the coupon for **Amazing Free Offer.**

Mail Coupon for FREE OFFER

NOW—TODAY is the time to mail the coupon for TREMENDOUS FREE OFFER. Get in on the ground floor and clean up the profits being distributed among my representatives. Just open and shut your demonstrator 5 or 6 times a day and you'll be making up to $30, $40, and $50 a week just as easy as singing a song. You can't afford to wait, because territories are being taken as fast as we can hand them out. Mail your name and address on coupon below, and I'll reserve your territory for you.

P. J. HARRAH, Pres.
Kant-Slam Door Check Co.
Dept. E-11 BLOOMFIELD, IND.

P. J. HARRAH, Pres.
KANT-SLAM DOOR CHECK CO.,
DEPT. E-11, BLOOMFIELD, IND.

Dear Mr. Harrah: Please reserve my territory, and send me full details of your AMAZING FREE OFFER. I am not obligated.

Name .....

Address .....

Town ..... State .....

STRAIGHT-LINE

5. Why did you enter this contest? (See page 84)

Footprints Trap the Forest Firebug

(Continued from page 71)

motive for the crime was established in the fact that the man who was accused had long been nursing a grudge against the lumber company that owned the timberland, and had made threats to the effect that "Some day I'll get even with them."

The United States Forest Service for many years has had to contend with forest fires that are set by stock owners for the purpose of creating pasture lands. This, of course, is a serious offense, and the punishment for it may be a heavy fine or a term in a Federal penitentiary, depending upon the circumstances. Such fires are less numerous nowadays because a good many of the offenders are now doing time. Education has also condemned this practice in the great, unwritten law court of public opinion.

Yet, such incendiary fires do occur now and then, and Uncle Sam makes short shrift of such offenders when they are caught. California furnishes the very unique case of a pasture-making forest firebug who was sent to prison through being identified by the footprints of his dog.

This man set a fire trap that consisted of a bundle of matches placed in dry brush and grass, and a magnifying glass mounted in a forked stick so the rays of the sun would be concentrated upon the match heads. This arrangement had been made late in the afternoon with relation to the sun so the fire would be started about 2 o'clock in the afternoon of the following day. By the strangest coincidence, this fire trap went off almost under the nose of a hunter who was poking around in the brush after a rabbit. He put out the fire before it really got started, and immediately notified the forest officials.

Various clues were found to the identity of the person who set this fire trap, and by no means least important were the footprints of a dog. The dog had apparently accompanied his master while the fire trap was being set, and in running about had left his footprints, or paw-prints, all over the place. The footprints of the dog revealed the fact that the animal was lacking a toe on his left forefoot. Naturally enough, the hunt for the criminal then centered upon finding a man who had a dog lacking a toe on his left front foot. And it didn't take the detectives very long to find a local

(Continued on page 208)

Does Your Favorite Star Like the Great Outdoors?

WRITE and FIND OUT! He'll Answer Your Letter!

Each month five stars personally reply to all letters addressed to them through SCREEN PLAY Secrets. Enjoy the wonderful thrill of corresponding with your favorite star! For full particulars, see

September

Screen Play secrets

On Sale August 5

Burn Oil Newest Way

The LACO

No Coal-No Ashes

Amazing Low Cost

Be The BIGGEST OIL BURNER DEALER

Somebody in your city is going to make a lot of money in the oil burner business—America's fastest growing industry. Line up with the nationally advertised complete line of Laco. World's lowest priced oil burners, and be that man. Our dealers report profits from $10,000 to $50,000. Send for sensational SPECIAL OFFER Now, big 4 Color Outfit and Special Selling Plan!

Don't deny yourself the convenience and carefree happiness of Automatic Oil Heat longer. Laco, America's wonder burner, cuts heating costs to a mere fraction. Revolutionary new principle—the L. S. Patented Laco Mineral Wick—burns oil with air. As the oil rises through the mineral wick, it is converted into hydrocarbon gas, the most responsive medium of exciting heat ever known. It eliminates fuel wastes, smoke, soot, grease, and costs itself—so low it pays to waste time and money on coal.

FITS ANY STOVE OR FURNACE I. ST. NTLY

Homes, apartments, commercial buildings, everywhere that oil heat is demanded but where costly coal must be conserved, Laco meets the need. Fits instantly into present heating plant, making it modern, clean, automatic. Laco is better than the ordinary kitchen range. Unusually quiet. A world leader for economy and efficiency.

EASY PAYMENTS

It costs but a few cents per day to own a Laco. Easy payments, embody an offer you can afford it. Write for full information, sensational low price, and SPECIAL introductory offer.

LACO OIL BURNER CO., 2013 Union St., Griswold, Iowa, U. S. A.

GEORGE F. JOWETT
Champion of Champions

I'll Show You How to Do These 12 Stunts for 25c

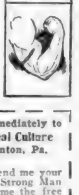
A Complete Illustrated Course

Amaze your friends with strong man feats. In a jiffy I show you the inside of doing the 12 strength stunts featured here. I have proven to science that brute strength alone cannot accomplish these stunts. I have proven that you must know how—that you must understand gravitation and resistance and when you do, everything is easy. I point the way with my short cut methods so that within an amazingly short time these stunts, which now seem difficult, become easy for you. You will soon amaze your friends. You will enjoy popularity and be admired by both sexes.

The inside, easy way to do these strength stunts has never been revealed before. I show you how with my illustrated course for the small sum of only 25c.

FREE—The Thrill of Being Strong

Those who send me 25c at once for my illustrated course showing how to master 12 strong Man Stunts, will receive absolutely free a copy of my wonderful book, "THE THRILL OF BEING STRONG." It contains photographs of strong men and shows how easily you too can have nerves of steel and muscles of iron.



Fill in the Coupon and mail immediately to

The Jowett Institute of Physical Culture
422 Poplar St., Dept. 37J, Scranton, Pa.

Dear Mr. Jowett:

I am enclosing 25c. Please send me your special course which shows 12 Strong Man Stunts made easy. Also send me the free copy of "THE THRILL OF BEING STRONG."

Name .....

Address .....

You Can Build Your Own Plane

Experience the thrills of zooming, diving, and chasing clouds thousands of feet above old Mother Earth—fly your own airplane, which you can build from complete plans presented in **Modern Mechanics' FLYING MANUAL.** You can choose the type of plane you prefer from the numerous designs in the Manual. Is it speed you're after? Then pick the Baby Bullet Raceplane, fastest of its type ever built. Or perhaps you prefer a sportplane—then choose the Alco. And there's the Lincoln biplane for those who favor that type, and the Northrup glider for enthusiasts in this latest thrilling aerial sport.

These are only a few of the good things in the book, which includes articles on how to make your own airplane engine—airplane welding—why an airplane flies—flying your own plane—and scores of other features by such famous pilots and plane designers as Ivan S. Driggs, Gene Shank, Orville Hickman, J. M. Allison, Weston Farmer, Stewart Rouse and Ed Heath. You'll find them all in the

FLYING MANUAL

1930 EDITION

You can get a copy of the Flying Manual from your nearest newsdealer or bookseller. If he cannot supply you, send one dollar—in stamps or coin—to Modern Mechanics, Minneapolis, Minn., and your copy will be sent you immediately. Modern Mechanics' Flying Manual is a Fawcett publication.

$1.00
A COPY AT YOUR NEWSSTAND

FREE Radio Handbook

Write today for *your* copy of the new Radio Association handbook. Shows you easy ways to make money in Radio. Tells you how our members are cleaning up $3.00 an hour spare time. Write for Membership Plan which need not cost you a cent and FREE RADIO HANDBOOK.

RADIO TRAINING ASSOCIATION OF AMERICA
Dept. MM-9 4513 Ravenswood Ave., Chicago

Learn Public Speaking

At home—in spare time—20 minutes a day. Overcome "stage-fright," gain self-confidence, increase your salary, through ability to speak effectively before anybody. Write now for free booklet, 48 effective secrets in Plain Words.

NORTH AMERICAN INSTITUTE, Dept 3286
3601 Michigan Avenue, Chicago, Illinois

PATENTS

Trade Marks, Copyrights, Patent Litigation Handbook with illustrations, 100 mechanical movements. Sent free on request.

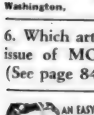
ALBERT E. DIETERICH
formerly member examining corps U. S. Patent Office
PATENT LAWYER and SOLICITOR
261-A, OURAY BLDG.
30 Years' Experience Washington, D. C.

MAKE MUCH MONEY

Making and Selling Your Own Products. Formulas, Processes, Trade-Secrets. All lines. Automobile Specialties. Cleaning, Polishing Compounds. Food Products. Toilet Preparations, etc. Expert Analytical Service. Catalog, circulars free.

A. THAXLY CO.
Washington, D. C.

6. Which article do you like best in this issue of MODERN MECHANICS? (See page 84)



SHAPE your NOSE

Anita Nose Adjuster shapes flesh and cartilage — quickly, safely, painlessly, while you sleep or work. Lasting results. Gold Medal Winner. Doctors praise it. 78,000 users. Write for FREE BOOKLET.

ANITA INSTITUTE, 375 Anita Bldg., NEWARK, N. J.

NEW SCIENTIFIC WONDER

"X-RAY" CURIO

10c
3 for 25c

BOYS BIG FUN. You apparently see thru Leather, Wood, Bone, any object. See Bones in Flesh. FREE PKG. radio picture film, takes pictures without camera. "You'll like 'em." 1 pkt. with each 25c order.

"Silver Only"

MARVEL MFG. CO., Dept. 66. NEW HAVEN, CONN.

Get into the Air *from the Ground!*

AVIATION holds the greatest future of any vocation a young man can choose today. Get into it *now*, by the shortest, most practical route—*from the ground*, as a mechanic.

With the new course in Aviation Engines offered by the International Correspondence Schools, you can quickly gain the knowledge that will qualify you as an expert aviation mechanic. The lessons were written by such experts as Lieut. Commander D. M. Carpenter, U.S.N., formerly in charge of ground training at the Pensacola Naval Air Station.

The course includes a study of the necessary Mathematics, Mechanical Principles, Heat and Its Effects, Combustion and Fuels, Principles of Gas Engines, including the newer Diesel-type engines, Construction of all present-day Aviation Motors, Carburetion, Ignition, Lubrication and Cooling, Pumps, Propellors and other accessories, Aviation Engine Management, Repair and Maintenance.

You can start at *once*. No need to give up your present job. You can study at *home* in spare time.

It costs nothing to find out all about this splendid new course in Aviation Engines, or any other I. C. S. course that interests you. Mark and mail the coupon *today!*

INTERNATIONAL CORRESPONDENCE SCHOOLS
"The Universal University"
Box 2324-F, Scranton, Penna.

Without cost or obligation on my part, tell me how I can qualify for the position or in the subject *before* which I have marked an X.

AVIATION ENGINES

- ☐ Complete Automobile Course
- ☐ Automobile Electric Equipment
- ☐ Electrical Engineering
- ☐ Electric Lighting
- ☐ Mechanical Engineer
- ☐ Mechanical Draftsman
- ☐ Machine Shop Practice
- ☐ Railroad Positions
- ☐ Civil Engineer ☐ Mining
- ☐ Surveying and Mapping
- ☐ Plumbing and Heating
- ☐ Steam Engineering
- ☐ Gas Engine Operating
- ☐ Complete Gas Engine Course
- ☐ Architect
- ☐ Architects' Blueprints
- ☐ Contractor and Builder
- ☐ Architectural Draftsman
- ☐ Concrete Builder
- ☐ Structural Engineer
- ☐ Chemistry ☐ Pharmacy
- ☐ Agriculture
- ☐ Navigation
- ☐ Mathematics ☐ Radio

BUSINESS TRAINING COURSES

- ☐ Business Management
- ☐ Industrial Management
- ☐ Personnel Management
- ☐ Traffic Management
- ☐ Accounting and C.P.A. Coaching
- ☐ Cost Accounting
- ☐ Bookkeeping
- ☐ Secretarial Work
- ☐ Spanish
- ☐ French
- ☐ Salesmanship
- ☐ Advertising
- ☐ Business Correspondence
- ☐ Show Card and Sign Lettering
- ☐ Stenography and Typing
- ☐ English ☐ Civil Service
- ☐ Railway Mail Clerk
- ☐ Common School Subjects
- ☐ High School Subjects
- ☐ Illustrating
- ☐ Cartooning

Name .....

Street Address .....

City ..... State .....

Occupation .....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal.

MONTHS of THRILLING FLIGHTS

Model No. 21

Silver Arrows have flown 200,000 miles. In 193 recent tests out of 200, they outflew all other planes, regardless of price. A proved success! Not a construction toy but fully built. Ready to fly in a moment. Balsa wood wings; aluminum cabin, propeller; adjustable wing; strong elastic motor. Model No. 21, Cabin type, wing spread 22 in., $2.50 (West of Miss., $2.75). Other models, Racing and Cabin, at $1 to $3.50. If your dealer cannot supply you, send your order to us. Kingsbury Mfg. Co., 106-1, Myrtle St., Keene, N. H.

Join Silver Arrow Flying Club and become a Master Pilot.

KINGSBURY MOTOR DRIVEN TOYS

FREE! Novelty Motor-scope shows motion picture of Silver Arrow flight. Also complete toy catalog.

Send 10c for Kingsbury Free Wheel, Balloon Tire Kraser, Set of 4, 35c.

Rotary Stencil Duplicator '39

Print Bulletins, Circulars, Programs, Letters, with the Amazing "EXCELLOGRAPH"

Simple and easy. Just write, typewrite, draw or trace on dry stencil, place in position and print up to 1,000 copies per hour. All supplies and instructions furnished. Guaranteed 10 years. Prints any size from postcards to sheets 9X14. Does beautiful work.

SAVE MONEY—MAKE MONEY

Saves and makes money for Merchants, Ministers, Teachers, Offices etc. Use it to build your business. Do work for others at big profits.

Write for Free Book—TODAY

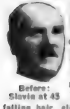
Dropped at our risk. Postpaid. Mail Graphite Back Guarantee. Amazing value. Thousands in use. Get free book describing all details and easy payment plan.

Easy Terms

PITTSBURGH TYPEWRITER & SUPPLY COMPANY

Dept. K2 339 Fifth Ave. Pittsburgh, Pa.

Will Grow Your Hair Or Cost Nothing



Before: Slavin at 45

Growing hair is now a science. Hair roots don't die. They get clogged with dry alkalins and toxins and the hair shaft simply can't grow out.

Our treatment removes these and supplies nourishment. It has grown hair on thousands of heads and is guaranteed to grow hair on your head, stop falling hair, eliminate dandruff, and relieve itching scalp or refund will be made of every cent of your money. Don't suffer baldness or any abnormal scalp condition any longer. Send NOW for FREE information without any obligation on your part.

After: Slavin at 65

SLAVIN INSTITUTE, Dept. 16, 508 S. Dearborn St., CHICAGO

Footprints Trap the Forest Firebug

(Continued from page 204)

settler who knew a man who owned a dog that had been caught in a fox trap several years before. Then they found the dog, found the man, and unloaded upon him the evidence that obtained his plea of guilty when he got into court.

Forest fires are a menace that annually inflict an appalling loss upon the people of the United States. They affect every man, woman and child of the entire nation. Hunters, fishermen, campers, and others who use the forest areas as their places of recreation, are usually friends of the forests and the last persons in the world to start fires. But Uncle Sam has some very strict laws enforcing care upon those who are careless with fire, and for dealing out swift justice to pasture-making firebugs, Bolshevik destroyers, forest arsonists, and pyromaniacs. Plaster cast records of their footprints are only one of the methods developed in recent years for "pinning the bee" upon the fellow who starts a forest fire by carelessness, ignorance, or deliberate intent. The person who starts a forest fire nowadays, no matter how clever he may think he is in covering up clues that might lead to his detection, runs a desperate risk of going to prison.

I POSITIVELY GUARANTEE

to increase your arms one-half inch in size, chest one full inch, strength 25%, health 100% in one week's time, by following my instructions and using my exerciser 10 minutes mornings and at night. Send $1 for complete course and exercisers. Satisfaction guaranteed or $1 refunded.

PROF. J. A. DRYER
Box 1850-R Chicago, Ill.

CHANCE to EARN $150 to $300 WEEKLY Introducing

ZENITH WHIRLGAS ENGINE BOOSTER

Whirling . . . Super-charging POWER, SPEED, MILEAGE

Let your Motor have increased Speed on less Gasoline, prevents Carbon. Millions of Gallons going to waste, *now can be saved. NEW INVENTION* proves successful, thousands being sold. Fits all Cars, Trucks, Motor Boats, Tractors and Airplanes. Big income profit. Contract to Salesmen, Agents, Managers. We will tell you how you can obtain a **sample free.** Write for **Free thirty day trial offer.**

Dept. D, ZENITH MFG. CORP., 1456-13th Street, Milwaukee, Wis.

Speed Heads 8-12 Valve system for Ford. Hi-speed Camshafts for all Cars. Zenith Racing Carburetors Paint Spray Guns. Car Washers. Oil Guns, many other Motor necessities.

The Finest Story of the War!

ARTHUR GUY EMPEY

World war hero, scenarist, and author.

TERRENCE X. O'LEARY

of the *Rainbow Division*

By ARTHUR GUY EMPEY

"Tin Soldiers" was the name Terrence X. O'Leary, the fighting Mick, gave to the famous Rainbow Division when he was forced to join it. But the time soon arrived on the battlefields when Terrence was glad to admit his error. They were "iron soldiers" and heaven help the doughboy critic who disputed it.

Look for this Cover

—in the September issue of—

Fawcett's **Battle Stories**

ON SALE AUGUST 10th

If your newsdealer is sold out send 25c to Battle Stories Magazine, Fawcett Publications, Inc., Minneapolis, Minn., and a copy of the September issue will be mailed to your address immediately.

10,000 Chest Expanders ONLY 99¢ EACH!

These are genuine heavy cabled progressive exercisers of powerful tension and resistance. Each cable contains 50 pure rubber strands, and is fully guaranteed. Never before in the history of physical culture have these exercisers been offered at such a low figure.

It is done now only because we are getting out our new line.

Less Than the Price of a Meal!

If you buy elsewhere you will pay more than twice as much, and perhaps five times as much. Don't forget that we are direct manufacturers, and if it weren't for this Special Summer Offer, you would never have the opportunity to make the best buy you ever made. Just think of it! A genuine guaranteed 5 cable 50 strand para rubber cable exerciser for only 99c! Less than the price of a good meal! We also have a few 10 cable progressive exercisers on hand at $1.85.

FIRST COME, FIRST SERVED

Order your exerciser now, before it is too late! This offer is good for a limited time only. After that you will have to pay a great deal more. Get this wonderful health-builder that should be in every home.

It only takes a minute. Just sit down, clip the coupon, write your name and address on it, and mail it to our address.

Buy 2 or 3

at this unheard of price. Use one yourself and one or two more for gifts to friends. This is a real opportunity!

DEALERS ATTENTION!

Here's your chance to purchase a supply of honest-to-goodness guaranteed progressive exercisers at a price far below normal. You can resell them to your store customers for as high as $3 for the 10-cable exerciser. Order a sample of each model to try out and test to your satisfaction, then order any number you desire. No order is too large or too small. Here's a buy at a price you never thought possible.

COMPLETE INSTRUCTIONS

Complete instructions for scientific body-building are given away absolutely free with each exerciser. With these you will find it a simple thing to develop your strength and grow healthy.

SEND NO MONEY

Just pay the postman for the exerciser when it is delivered to you, plus a few cents postage.

PROGRESSIVE EXERCISER CO.,
Langdon Building, Dept. 1605, B'way & Dunne St., New York City
Gentlemen: Please send me your [ ] 5 cable guaranteed exerciser @ 99c
[ ] 10 cable exerciser @ $1.85
(Check the one you want.) It is understood that I am to get your instructions for using absolutely free. If I am not satisfied, I can return the exerciser within five days and you will return my money.

Name ..... Age.....
Street .....
City and State .....

JUST CLIP THIS COUPON

Over the Mountains from Los Angeles 559 Miles on 11 Gallons of GAS

Think of it! FIVE HUNDRED FIFTY-NINE MILES over rough mountainous country burning only ELEVEN GALLONS OF GASOLINE. Imagine more than FIFTY MILES to the GALLON. That is what the WHIRLWIND CARBURETING DEVICE does for D. R. Gilbert, enough of a saving on just one trip to more than pay the cost of the Whirlwind.

THE WHIRLWIND SAVES MOTORISTS MILLIONS OF DOLLARS YEARLY

Whirlwind users, reporting the results of their tests, are amazed at the results they are getting. Letters keep streaming into the office telling of mileages all the way from 22 to 59 miles on a gallon, resulting in a saving of from 25% to 50% in gas bills alone.

Mark H. Estes writes: "I was making 17 miles to the gallon on my Pontiac Coupe. Today, with the Whirlwind, I am making 35 5/10 miles to the gallon. Am I glad I put it on? I'll say so!"

P. P. Goerzen writes: "I made an actual test both with and without a Whirlwind, getting 13½ miles without and 34 6/10 miles with the Whirlwind, or a gain of 21 miles to the gallon. The longer the Whirlwind is in use on the machine the better the engine runs, has more pep and quicker starting. It makes a new engine out of an old one, and starts at the touch of the starter button."

R. J. Tulp: "The Whirlwind increased the mileage on our Ford truck from 12 to 26 miles to the gallon and 25% in speed. We placed another on a Willys-Knight and increased from 12 to 17 miles per gallon."

Arthur Grant: "I have an Oakland touring car that has been giving me 15 miles to the gallon average, but I can see a great difference with the Whirlwind, as it climbs the big hills on high and gives me better than 23 miles to the gallon of gas, which is better than 50% saving in gas."

W. A. Scott: "I had my Whirlwind for three years. Winter and summer it gives the same perfect service, instant starting, smoother running, and what I have saved in gasoline these last few years has brought other luxuries which I could not have afforded previously."

Car owners all over the world are saving money every day with the Whirlwind, besides having better operating motors. Think what this means on your own car. Figure up your savings—enough for a radio—a bank account—added pleasures. Why let the Oil Companies profit by your waste? Find out about this amazing little device that will pay for itself every few weeks in gas saving alone.

FITS ALL CARS

In just a few minutes the Whirlwind can be installed on any make of car, truck or tractor. It's actually less work than changing your oil or putting water in the battery. No drilling, tapping or changes of any kind necessary. It is guaranteed to work perfectly on any make of car, truck or tractor, large or small, new model or old model. The more you drive the more you will save.

SALESMEN AND DISTRIBUTORS WANTED

Free Sample and $100.00 a Week Offer

Whirlwind men are making big profits supplying this fast-selling device that car owners cannot afford to be without. Good territory is still open. Free sample offer and full particulars sent on request. Just check the coupon.

WHIRLWIND MANUFACTURING CO.
999—317-A, Third Street Milwaukee. Wis.

GUARANTEE

No matter what kind of a car you have—no matter how big a gas eater it is—the Whirlwind will save you money. We absolutely guarantee that the Whirlwind will more than save its cost in gasoline alone within thirty days, or the trial will cost you nothing. We invite you to test it at our risk and expense. You are to be the sole judge.

FREE TRIAL COUPON

WHIRLWIND MANUFACTURING CO.,
999 317-A, Third Street, Milwaukee, Wis.

Gentlemen: You may send me full particulars of your Whirlwind Carbureting device and free trial offer. This does not obligate me in any way whatever.

Name .....

Address .....

City .....

County ..... State .....

☐ Check here if you are interested in full or part time salesmen position.

Astonishing Electrical Invention

Protects Your Car from Thieves

...Automatically!

his unquestionably is the queerest, most incredible vention since the first discoveries of radio! A magi-, shouting, automatic watchman that actually is far ore than human! Never sleeps, rests or gets tired! Stands guard over your entire car from spare tire to headlights and steering wheel! Endorsed by police! Approved by Motor Associations! Now offered on generous 5-day test basis! The coupon brings full details.

A STARTLING UNCANNY MONEY-MAKER FOR AGENTS

WHAT makes it work?" "Where on earth did you get it?" "Bet you five dollars he's got some one hiding in there!" simply can't be true." A running fire of comment like this aks out whenever and wherever this new invention exhibited. And why not? When no one ever eard of such a startling, uncanny device before! fact few people would even dare to dream there ld be such a thing! So this, men, is something By NEW, something to grip the imagination of ryone, something that sells to every untoist on er novelty alone. Distributors, "star" salesmen, ry man who wants to double and triple his present ome should note carefully the following facts.

The Secret of a Theft-Proof Car

Sow in this amazing new way, every car can be tected from theft for 24 full hours a day. In the age or parked on the street, if any thief so much pulls at your spare tire or touches his foot to your ning board—ZOWIE! A riot of noise starts instly! And your car never shuts up till the thief es. And listen to this. Even if the thief is wise what's up, you alone have the secret control but anywhere you want it around the car. The thief 't possibly find it. If he wastes time looking for Bingo! He's caught and on his way to jail! This astonish- invention guards your spare-tire, headlights and spots as well as the car itself.

talled in 10 Minutes—Costs Nothing to Operate

he inventor has asked the U. S. Government to protect patent rights on this revolutionary discovery. Because of uncanny powers and to distinguish it from everything else ered this marvelous discovery is called the Devil Dog. ong its amazing features is the fact that it can be installed anyone in 10 minutes or less. There is absolutely no cost for operation. It will last as long as the car. Fits any car from Ford to Rolls Royce without adjustment or fussing.

For introductory purposes a special 5-day test offer is now being made. If you are interested in learning about the most astonishing invention since the radio first came in, use the coupon at once. If your present income is less than $50 a week, the profit possibilities as our agent may astonish you. The coupon brings details of all offers. Mail it now.

Northwest Electric Corp.
Dept. M-550
PUKWANA, SO. DAKOTA

AUTOMATIC
DEVIL DOG

Northwest Electric Corp.,
Dept. M-550, Pukwana, So. Dakota.
Rush details of your big 5-day test offer and big profits for agents.

Name .....
Address .....
Town ..... State .....
☐ Check here if interested only in one for your own car and not in agents' money-making offer.

FARNHAM S. MINNEAPOLIS